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Simulations:
Yesterday, Today & Tomorrow

by Ed Dille

Life is the ultimate simulation, and everyone definitely plays for keeps. As such, why did we ever feel the need to create simulations? Maybe for the sake of escapism, maybe because we couldn't do all the things in our lives that we wanted to, maybe just because they are fun? Whatever the reason is that you play simulations, chances are that you keep good company, and a fair amount of it at that.

Simulations have always had longer legs than titles from other genres, simply because replay value is based on the quality of the experience, not the end point of the programming. Simulations gamers willingly fill in the gaps between real life and their favorite games, provided of course that the games do something to create suspension of disbelief. So what is it all about? Immersion.

When we play anything, we want to be consumed by it, distracted from the real world and immersed in an alternative reality. Not virtual reality, mind you, for that has not been defined in any real sense yet, but an alternative reality. The distinction is important to understand because we have already learned how to do this with other forms of media. Who among us hasn't been sucked into the storyline of a good book, or seen ourselves on the big screen as the protagonist of a feature film? Granted, some gamers would argue that interactivity has already promoted greater suspension of disbelief in their hobby than in either form of media just mentioned. But is this really the case?

When you read a good book, you get caught up in the plot less because of action or pacing than by developing empathy for your "alter ego" in the story. The same applies to a lesser degree in films and television. The quality of the experience is directly propor-

tional to how strongly you relate to that central character, either via personal experience or unrealized expectations. The method of achieving that connection is well established in film and print media. It is much less clearly defined in electronic entertainment. as that media continues to evolve at an astronomical pace.

Within electronic gaming, some genres lend themselves to the development of empathy more readily than others. Role playing games, fantasy or otherwise, virtually require players to adopt a silicon surrogate within the game environment. This device definitely

promotes a bond between what is transpiring with the onscreen character and the mind behind the glass but, with the exception of those games which utilize first person perspective and character development (like *Ultima Underworld, Shadow of Yserbius*, etc.), that perception is definitely filtered via the two dimensional perspective. Alternatively, there are games like *Heretic*, where the first

person perspective promotes the sense of being there, but the characters are static and players never develop a sense of affinity for them.

Now, let's turn to simulations to determine how designers have been dealing with these same issues so far, and also to speculate about some ways that they might do it better.

The two largest "breakout" simulators from the early days of gaming were *Silent Service* and *F-15 Strike Eagle*, both from Microprose. Neither of these titles featured graphics that even remotely approximated visual reality. For example, all ground targets in *F-15 Strike Eagle* were simple triangles, regardless of what they were supposed to represent. Also, neither title included any onscreen representation of the player. For players to believe in these gaming environments, which interacted with their vehicles but never with themselves, they had to make the imaginary leap that they were in the

cockpit/conning tower devoid of the technology we have today to help them do so. Facilitating a gaming environment where players make that leap effortlessly is the goal of every simulation, and a lot of tools are used to achieve that goal.

One of the first such devices to appear was to show the "player's" legs and hands inside the foreground of the cockpit, in lieu of a pure instrumentation. This was novel the first time it was used, and some players got off

to have them communicate with the player via scrolling text messages. Naturally, this was one way communication and that didn't change when audio files replaced text bars. When multi-player flight simulations like Kesmai's *Air Warrior* came along, two way text communication became possible, and two way voice is only now appearing.

And how has sound itself enhanced our suspension of disbelief? Remember the days when the engine drone never increased or

the ASW sound signature files used in Electronic Arts' *Seawolf*. Remove yourself one step further and look at current technology. With the proper headset and sound card, individual sound sources can be placed anywhere in a virtual 360 degree sphere around the player's head. Further, these sounds stay fixed in space at their preprogrammed point of origin, *regardless of the direction the listener turns their head*. In other words, if you hear a train bearing down on you from dead ahead and you turn your head to the right, the sound will get slightly quieter in your left ear and slightly lower in your right ear. Finally, these sound sources do not have to be static, which means the Doppler effect can give players audible cues to the relative motion of objects in the gaming environment as well.

And what of visuals then and now? Returning to *F-15 Strike Eagle*, the point of view was locked such that players had to actually maneuver the aircraft to change their view out of the cockpit. Next, some brilliant designer came up with the concept of using function keys to represent the cardinal directions and allow players to "turn their heads" without maneuvering. These options quickly became too constraining as well, so some titles took advantage of programmable joysticks to allow players to swivel their point of view with a hat switch. Now, with the advent of the first commercially viable "VR" headsets of any quality, players can feel natural moving their head and seeing a corresponding change in the visual presentation. Even when combined with the spatial audio mentioned previously, however, has one achieved the level of immersion promised by other media? No! Why? Because we don't *feel it*!

Am I proposing a pneumatic suit filled with bladders that inflate and push blood to our heads or feet so we redout or blackout realistically? Absolutely not. Rather, give me a simulation that includes elements of camaraderie and shared experience outside the cockpit/conning tower/tank cupola such that I actually give a damn when my RIO takes one for the gipper, a la *Top Gun*. That's an alternative reality I can live with, and one that I would return to again and again. As for Virtual Reality, they can keep it until the holodeck is done and it is virtually impossible to distinguish from the real deal.

on how the onscreen hand moved the flight stick in conjunction with their offscreen input, but the appeal didn't last long. One of the next steps was to provide wingmen for the player (it's always nice not to be alone out there), and

decreased in pitch regardless of throttle positioning? How far removed was that from the teeth rattling thump of .30 caliber rounds ripping through the fuselage that first entranced pilots of Lucasfilms' *Their Finest Hour*? Or

Photo: Arms Communications

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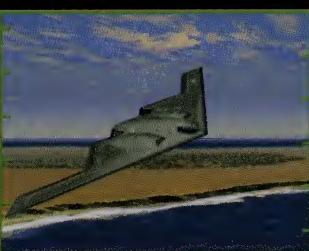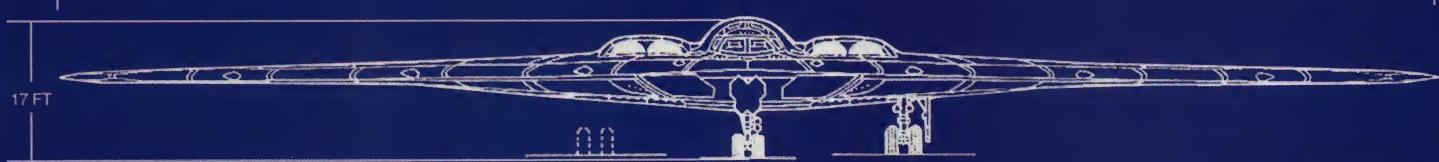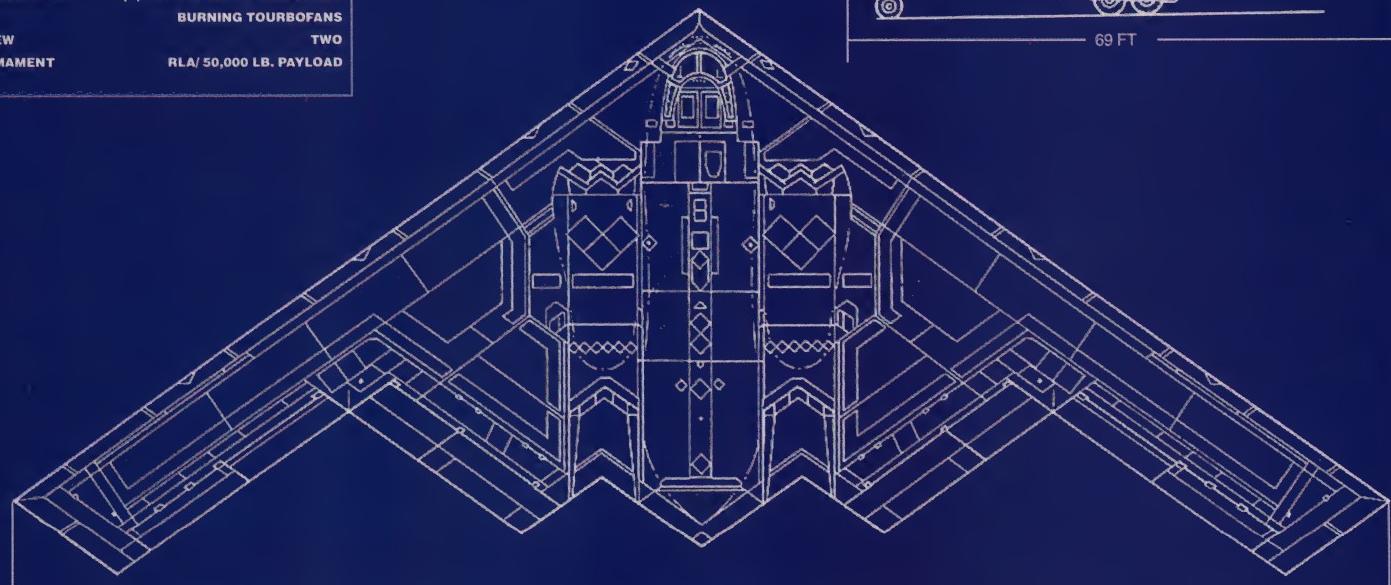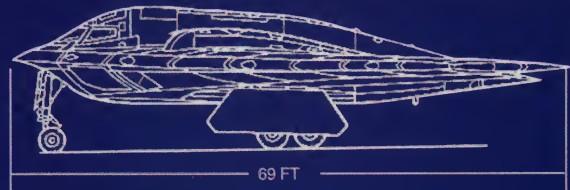
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News ✈ from the Front

Compiled by Laurie Yates

FRONT LINES

Command & Conquer Rolls Over US and Europe like Patton took Germany

Westwood Studios Spawns Strategic Wargame Phenomena

Selling almost 400,000 units in its first ten days of worldwide release, Westwood Studios *Command & Conquer* for the PC has emerged as the major success story of the early holiday software season. The game, which is based on the engine Westwood created for Virgin in *Dune 2*, hit a nerve among gamers, crossing over from the hex-grid Gary Grigsby market into mainstream viability.

Here's what it comes down to: remember Michael Richards (aka Cosmo Kramer on NBC's *Seinfield*) on the old ABC sitcom *Fridays*? He portrayed the character of a 10-year-old boy obsessed with toy soldiers who took the realism level a little too high, pouring lighter fluid over his toy soldiers,

then setting them aflame while providing the accompanying screams of rage and pain. All little boys love playing with toy soldiers. Somehow, *C&C* plugs into the alchemy of that dynamic with its new game. Players position Devils Tongue Incinerator Tanks, Harvesters, and other ingenious engines of war against a backdrop of extended warfare between the relatively benign GDI and the more coolly sinister Brotherhood of Nod.

Westwood and its distributor/partner, Virgin Interactive, in fact, took the whole process to the next level by producing actual movie trailers, which have already been shown in European theaters to great crowd reaction. (Of course in Germany, a peace-

loving country with no reputation whatsoever for getting into cool black leather uniforms and wargames, the human soldiers were digitally transmogrified into robots, so our German brothers could enjoy virtual warfare without historical guilt trips spoiling the fun.) In fact, the coming attraction idea proved so successful that Westwood staged a trial run of the German trailer in a movie theater located in the Gold Coast Hotel Casino in Las Vegas on November 10, 1995, to extremely favorable audience reaction.

Command & Conquer 2 is already in the works, as is a prequel scenario along the lines of Origin's *Strike Commander*.

NVidia Enters PC Video Board Wars

NVidia, 3-D Blaster, and ReelMagic Face Off in the PC Arcade Zone

Until recently the PC CD market was the most stable place in the electronic gaming universe. While Sega, Nintendo, Sony, Atari, 3DO, and the other console players scrambled in a non-compatible console marketplace, the PC world appeared tranquil by comparison.

That's all over. One of the more interesting monkey wrenches tossed into the Comdex machine was the revelation that non-compatible PC video boards are now moving through the industry like blind dinosaurs voguing in the multimedia mosh pit.

Here are the players: 3-D Blaster, backed up by the power and industry credibility of Creative Labs; NVidia, armed and dangerous

with several Sega Saturn titles (*Virtua Fighter Remix, Panzer Dragoon*, etc.), all of which play as well as they did on the Saturn; and ReelMagic, an MPEG-based power player that has the advantage of actually having been around for several years, building a catalog of strong titles along the way.

But what are gamers to make of all of this? Game playing computerists now have the capability of transforming their systems into legitimate arcade level delivery systems. But they must choose from among several non-compatible technologies to do so.

Sound and video boards have become the hot new peripheral for maxxing out game

play. NVidia, dedicated to the mission of transforming the PC into the Ultimate Multimedia Machine has created the NV1 engine. This engine, according to company

Is this the board that will push PC gaming into the next century?

spokesmen, is the first in the industry to accelerate all the multimedia APIs.

The NV1 Win95 Multimedia Accelerator provides several multimedia enhancements, with four main thrusts: real-time photo-realistic 3D graphics; video acceleration and texturing; concurrent, high fidelity audio; and a direct input engine.

The NVidia infrastructure combines familiar companies on both the hardware and software sides. NVidia is naturally providing the engine in the form of an NV1 chip, while Microsoft offers Windows 95, and to some extent, 3.1, as the platform. Diamond Multimedia is currently the only product provider, but more companies are expected to hop on the OEM bandwagon by first quarter 1996. Content providers currently include Interplay, Papyrus, Domark, and Sega.

The NV1 chip offers a number of capabilities, which were not normally available on one card. Graphically, the card allows for real-time photo-realistic 3-D graphics, video texturing, and full motion video (FMV) acceleration. On the audio side, the chip includes a wave table synthesis engine. Additionally, the NV1 has leading GUI acceleration; an enhanced digital game port; and concurrent media processing and synchronization. Most importantly, the NV1 is capable of supporting all the Windows 95 APIs, while maintaining compatibility with DOS standards.

Using Microsoft Windows 95 as the platform, the NV1 chip has complete synchronicity. Windows 95 features five major components: DirectDraw, Direct 3D, DirectSound, DirectInput, and DigitalVideo. Every feature of the NV1 directly correlates to one of these aspects.

Tom Kalinske, president and CEO of Sega of America, stated, we think PC owners will be as excited and engrossed by playing our games on the PC in their home offices as our Sega Saturn customers are with the big-screen, high-end audio experience in their family rooms. While most home-based entertainment will happen in the family room, the population of home PC users who want to take a break from traditional office applications with high-end PC games with arcade-quality graphics and speed is definitely growing.

Stay tuned; film at 11.

The NV1 chip smoothes out the graphics and permits more realism.

Virtual Forensics

It has been enshrined in the American consciousness as the Trial of the Century. Forget Scopes. Forget Nuremberg. Forget the Lindbergh Baby and Bruno Hauptmann, Charles Manson, and even the Menendez Brothers Redux. O.J. Simpson's litigious crucible has burned itself forever into the folklore of America.

What is less well known is the pivotal role computer simulations did play in this and will play in future litigation.

Fans of tabloid news shows were knocked out of their (non-bloody) socks last April when C/Net—a cable channel devoted

NVIDIA claims the digital game port permits both a quicker response and a finer degree of control.

exclusively to computers, the Net, and other techno news—ran a video clip of what purported to be a detailed computer simulation of the murders of Nicole Brown Simpson and Ronald Goldman. The video sequence was an eye-popper, employing state-of-the-art motion capture wedded with precise mathematical and forensic data to produce the most vivid murder simulation ever seen in the real world.

This spectacular piece of computer-generated footage was generated by BioVision, one of those companies with almost no name recognition, even inside the computer game industry, that nonetheless plays a major role in the brave new world of computer science.

"Most of what we do, I can't even talk about," a representative admitted at the recent Computer Game Developers Conference, presumably referring to various government and legal contracts which will likely have BioVision simulating everything from launch trajectories to detailed simulations of auto accidents.

Some of what BioVision does, however, *is* visible to the public—and not just the famous Simpson-Goldman murder footage, either. The company has produced extensive motion capture imagery for games such as Accolade's gridiron sim, *Unnecessary Roughness* and MTV's *Liquid Television*, (including the popular "Blockheads" video). Accolade producer David Friedland said that BioVision was selected to produce the motion capture for its football game because of its system operations. "Theirs is an optical motion-capture system as opposed to a harness system, which means there are no wires or cables. The motion actors are completely free to move as they see fit," Friedland stated. "We are currently," he added, "doing a martial arts-related game where there's a lot of jumping, spinning and flipping. I think they probably would have broken their necks if we tried to use a system with cables on them."

Mark Swain, a computer animation director for Colossal Pictures, used the BioVision system to create the Blockhead characters for MTV's *Liquid Television*. Brad de Graf, Colossal Pictures' director of digital media, is enthusiastic about BioVision's work. "[The technology] enables us to increase the speed in which we are able to realize a storyboard. We are actually acting out the animation, not keyframing it in the lab. We can do things that are essentially impossible with traditional techniques, such as the subtleties of human motion—the way someone plants his foot or stands on a chair. This is impossible to create any other way."

However, the road to true motion capture is not without its potholes. "Right now, our capture system can go up to 30 markers, which is enough to cover one actor," according to Dwayne Mason, technical coordinator of BioVision. "A lot of times, we find that people would like to capture two actors at the same time. Our next system should be able to handle that through higher resolution cameras and software that could manage, theoretically, up to 100 markers, which would be enough to see two people at one time."

Ken Kline, founder and director of Optimum Human Performance Centers, Inc. (OHPC) and BioVision, zeroes in on the inevitable time lag. While BioVision emphasizes a fast turnaround time, Kline believes "people would like to have representation quicker, and even though we've gotten the time down to exceptionally fast response from the time the action is actually done until it's represented, to be able to do it in real-time would be an advantage."

BioVision made a name for itself by providing computer analyses of golf professionals, including Arnold Palmer, Gary Player, John Daly, and Bruce Crampton. The 3-D models of players' swings have been broadcast on ESPN, CNN, ABC, and CBS. In the same vein, numerous athletes in baseball, tennis, soccer, football, volleyball, martial arts, and more have all received 3-D motion analyses. Kline observed that BioVision plans to film Canadian ice-skater Elvis Stojko working on a five-spin jump. Mason added, "The technology has become a handy instructional device. It is a very good teaching and coaching tool because you can break down any motion, at 200 frames per seconds, and see it in 3-D."

For all its high-profile work, however, the company isn't likely to be occupying a Nintendo-sized exhibition space at the next E3 expo. In fact, when this reporter informed a major game producer that BioVision was responsible for the popular O.J. Simpson computer footage he was amazed. "Geez," he said, stunned. "We've been using them for years, and I never knew they did that stuff!"

FRONT LINES

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Company Debriefings:

Simon & Schuster Interactive has cut co-publishing deals with C.I. Entertainment, a company formed by authors Tom Clancy and Dr. Steve Pieczenik. The two entities will utilize content created by Clancy and Pieczenik in CD-ROM as well as the traditional forms of content including books, audio tapes, and online material. The first project under development is Clancy's *First Contact: Derelict*, a space adventure which uses Virtus Corps 3-D, real-time technology. With Mark Fuhrman apparently unavailable, Ken Williams of Sierra On-Line has decided to release another game in the *Police Quest* series, once again hanging the entire operation around deposed LA police chief, Darryl Gates (you all remember the previous Darryl Gates hosted *Police Quest: Open Season*). Speaking of Sierra On-Line, Ken Williams' established software publishing house will also attempt to beef up its cred in the flight sim milieu by acquiring SubLogic, Inc. SubLogic was started in the early 80s by Bruce Artwick who literally created the genre with its *Flight Simulator* franchise, currently owned by Microsoft. According to *Interactive Daily*, Sierra, after citing flight simulation product retail sales of almost $80 million for the first three quarters of 1995, [Sierra] officials feel that niche in the interactive game arena is ripe for profits. Boy, can't get anything past the crew at Sierra. Flight simulators as a viable category in the computer software market, what a brainstorm!

Would You Buy a Used Software Franchise From This Man?

Origin and Jane's Combat Simulations are combining to create a truly authentic simulation experience featuring the most lethal attack helicopter today. AH-64D Longbow will feature fully textured rolling terrain, high

resolution 3-D visuals and complex avionics and weapons systems. Combine that with four different types of mission sets and it appears as if sim fans get busy with this title for a while (currently slated for Spring 96).

Longbow is the brainchild of ORIGIN producer Andy Hollis (Gunship, F-15 Strike Eagle II and III, as well as F19 Stealth Fighter). Players can fly a near future campaign mode with more than 40 missions set in the Baltic region. The missions are enhanced with cut animations and other non-interactive sequences that advance the campaign. Additionally, there are 12 historically accurate missions from Desert Storm and Operation Just Cause (Panama). A random mission generator extends the replay value of the product even further.

Hollis' development team is using actual operations manuals and design documents from the manufacturer of the aircraft, and

experts in the fields of aeronautical engineering and army intelligence to create avionics, dynamics and AI systems that will rival or exceed anything currently on the market.

Origin is on the move on the science fiction front as well. Expect BioForge Plus to appear in early 1996. Starring as the lead character, you awaken from an operation to find you've been transformed into a sophisticated Cyborg, but your memory has been erased. As the adventure continues, you escape from the exploding moon only to be forced into seeking refuge on board a mysterious derelict spacecraft. Soon, you are fighting for your life against a new series of enemies, while also attempting to repair the systems of the ship. Along with the expanded plot, Origin has also included an arena feature to allow players to refine their fighting skills "outside" the story proper.

Death from Below
SSI's Silent Hunter Scores Big Tonnage

by James R. Jones III

It's a little after midnight, you're at 65 feet below surface and in deep trouble. You've fought through a screen of three coastal destroyers, and two more are zigzagging toward you at over 25 knots. Ping-pang, ping-pang. Their sonar bangs off your hull as you struggle to get closer to the 15 moored

Silent Hunter, a WWII submarine simulation from SSI, pits you against the formidable Imperial Japanese Navy. *Silent Hunter* is unlike its most recent predecessor, *Command: Aces of the Deep* by Dynamix, in several areas. *Aces of the Deep* is a WWII U-boat simulation set in the North Atlantic,

ships in Kure harbor. A Japanese Kyosho-class destroyer is closing in fast from directly astern. The other is ahead of you somewhere, you're not sure how far. Nervously you watch the Torpedo Data Computer (TDC) as it clicks off the distance to the destroyer, closing in for the kill from behind. Aft Torpedo Tubes 9 and 10 show ready. At 750 yards, you send the command, "Fire 9...Fire 10...." Now you watch for the torpedo time-to-impact and hope for a solid hit. This isn't a simulation you play, this is one you experience!

while *Silent Hunter* focuses on U.S. submarine warfare in the Pacific. The water in *Command: Aces of the Deep* featured morph technology, a superior technique for water display, but lacked the same level of sensor detail found in *Silent Hunter*. The water in *Silent Hunter* is effectively handled in SVGA graphics, and the game offers the most accurate technical simulation of the sensors and tactics used in submarine warfare seen to date. Particularly noteworthy is the representation of the Torpedo Data Computer, one of

the most sophisticated computing devices of its day. With its 15 historical missions, campaign mode and ability to customize missions, *Silent Hunter* also edges out its competitor in sheer replayability.

Playing *Silent Hunter* can give you the impression someone at SSI stayed up too late one night watching *Run Silent, Run Deep*. This WWII film was one of the finest submarine movies ever made (yes, someone was there before Tom Clancy), in which both Clark Gable and Burt Lancaster gave memorable performances. In SSI's realistic and exciting submarine simulation, you *feel like Clark Gable*, and the line between fantasy and reality is constantly blurred. The SSI game developers really did their homework on this one, and the quality is consistent throughout. *Silent Hunter* conveys the action, intensity and horror of this submarine era that remained classified for over 40 years.

The quality of the simulation is maximized by good game design, a simple interface, high-quality graphics, exceptional sound effects and great payoffs, both visual and visceral. Players control the action via mouse, and movement through the interface is streamlined. A digitized control room allows one to navigate the submarine quickly and easily. The awesome SVGA graphics add

paign mode. The objective is to sink as much enemy shipping as possible, and the realism panel controls the number of points awarded for tonnage sunk. Awards and medals are also presented based on tonnage scores.

Although it may sound simplistic enough to design a two-dimensional map screen, there are actually several things that can go wrong, not the least of which are scaling inaccuracies. Fortunately, SSI has designed this display to be an elegantly simple tool for discriminating commanders. The maps are zoomable down to a detail level of a few hundred yards. From the map view, you can determine the course and speed of enemy ships by the size of their "tails," or wakes. The map provides an eagle-eye view of the tactical situation and updates vessel locations automatically at the lower levels of difficulty. As the difficulty level of the game is increased, the information is updated only when the periscope is raised. Naturally, raising the periscope also increases the chances of being detected. Consequently, players are

to the realism of the simulation, particularly during the two critical viewing aspects of the game, the periscope view and bridge view. Through these views, the highly-detailed models of the Imperial Japanese Navy's war machine are literally riveting to behold. Further, the AI for the opposition is so strong that players must use stealth and cunning at every turn to rack up tonnage scores that will be the envy of fellow sub commanders.

Silent Hunter provides 15 historically accurate missions, including those of William "Bud" Gruner, the technical advisor on the project and submarine commander of the USS *Skate* (see sidebar). Commander Gruner, who was awarded the Navy Cross and the Silver Star, narrates 15 interview segments complete with documentary footage and a digitized account of submarine warfare in the Pacific during WWII. Other interview segments cover tactics, Gruner's engagement of a Japanese Kongo class cruiser, and additional details designed to aid players in refining their war fighting skills. Players can also pick up helpful tips and hints from other sub skippers at the O-club in Pearl Harbor while their sub is being re-provisioned or repaired, thereby conveying to players the strong sense of community that pervades the Silent Service.

The campaign mode allows players to "join" the war anywhere from December, 1941 to December, 1944 . Different submarines are available at different time periods

of the war, including the Balao, Tambour, Salmon and the fearsome Gato class. Each of the submarine classes has limitations on tor-

pedo types and sensors. The submarine everyone will wait their career for is the Gato class. This sub has the most advanced radar system of the war, can take extensive damage and has more powerful engines for greater attack speeds. Another notable feature is the realism panel, which allows skippers to customize the level of challenge one can expect in either the historical missions or the cam-

forced (quite realistically) to make tactical decisions about the amount of information they might gain versus what they might give up to the enemy.

Intricate details abound on virtually every screen of *Silent Hunter*. For example, in the damage control screen, the 20-plus critical areas in the sub are recreated in a cutaway view. As each compartment takes damage, a

text report is displayed detailing what was damaged, the severity of the damage, and more importantly, how long it will take to repair. One learns the hard way that damage is, or can be, a progressive dynamic thing. For example, partial flooding in a somewhat innocuous compartment such as the forward battery room not only reduces the amount of

battery energy you have available for running your electric motors, but also creates poisonous chlorine gas. Damage to this compartment forces skippers to decide between risking the submarine in surface combat, where the gas can be vented out from the sub, or suffocating as the chlorine gas spreads throughout the other compartments.

The game's best feature, and a critical element to suspending disbelief during gameplay, is its sound effects. With *Silent Hunter*, SSI seems to have spared no expense in detailing an acoustic modeling technique that is unprecedented in naval simulations. The layers of sound in this simulation are deep and rich. Each ship type appears to have its own screw noise signature and frequency, making it easy to distinguish between a destroyer doing 20 knots and an oil-stuffed tanker doing eight knots. In addition, the volume of the sonar pings or screw noises grows as ranges shorten and decreases as ships move away (the Doppler effect). Enemy sonar pings alone reveal a great deal about the tactical situation. The pings vary from a

search ping that is distant, to a medium range acquisition ping with some sound rebounding from the hull and a bone-piercing attack ping that confirms that the enemy has fairly strong locating data, and possibly even a targeting solution on the sub.

The primary sensors used to locate and attack enemy shipping include an accurate

representation of a radar A-scope, which uses an energy line that pulses when a target ship is painted by the radar, and the TDC. The TDC was one of the most complex and critical computing devices of its day and allowed submarine commanders to launch their torpedoes at targets at nearly perpendicular angles. The combination of these sensors can also be used to engage targets on the surface with the 4.5-inch deck gun. Surface combat is used to pick off "stragglers" or wounded ships when you run out of torpedoes. During WWII surface combat was used sparingly, and in the game such combat is perilous for the player.

Back to your mission: your two torpedoes speed toward the unsuspecting destroyer. You can already hear the whoosh-whoosh-whoosh of the tin can's high-speed screws. A satisfying "kaboom" signifies that the torpedoes have found their mark. You can still hear the ping, ping, ping of the last destroyer somewhere up ahead. Raising the periscope, you can see the destroyer's silhouette in the middle of the channel. A quarter moon is just above the horizon, and off the port beam shine the port lights of the city of Kure. The TDC says the can is inside 4000 yards, but is beginning to zigzag. The forward tubes are still reloading. "Periscope down and make your depth 120 feet. Ping- pang, ping-pang." The destroyer's sonar has picked you up, and the TDC shows it's inside of 1100 yards. You're trying to get some depth, but the water beneath the keel shows only 30 feet. That makes your bottom-scraping maximum depth 95 feet. Not what any sub skipper wants to see. Whoosh-whoosh-whoosh. High-speed screws whine through the hull, via computer speakers, again. Here comes the tin-can. Splash, splash, splash. I can hear the depth charges coming down. Click-Wham. Click-click-wham-wham. Three depth charges explode and reverberate in your speakers. The destroyer's screws are loud now, directly overhead. Splash, splash, splash. This is going to be ugly.

The pounding goes on. Your dive planes are damaged but functional. The destroyer seems unsure of your location. Ping, ping, ping. You can hear him continuing down the channel, heading out to sea. You're through the harbor screen, at least for now. No more escorts show on the TDC. You proceed at a crawl until you're inside a circle of ships in the Kure harbor. Finally, all torpedo tubes are reloaded, and not a moment too soon. Rising to periscope depth, you can hardly believe your eyes. An aircraft carrier, a battleship and a huge oil tanker are among the more important surface combatants in the harbor. Rotating slowly to face the tanker and carrier, you dole out a recipe for destruction, four torpedoes for the carrier and two for the tanker. The aft four torpedoes are for the battleship. The carrier buckles as the torpedoes walk its port side, and it begins to quickly sink bow first as flames pour from the flight deck. The battleship has broken in two, and the tanker is afire from bow to stern. But there's no time for

long looks. Halfway back down the channel, forward tubes 1 and 2 are reloaded. From the far end of the channel, you can just make out a quiet "ping, ping, ping. The damage is done, but whether or not you will live to brag about it is another story..."

Silent Hunter is one of the most compelling submarine simulations done to date. With its incredible detail, rich graphics and visceral sound effects, this game redefines the standard for sub simulations to beat in years to come. So dive right in, the water ain't fine but it sure is fun!

Bud Gruner: The Man Behind the Periscope

Silent Hunter utilized the technical talents and advice from a decorated and noteworthy source. During WWII William "Bud" Gruner commanded the submarine USS *Skate* and was awarded the Navy Cross and Silver Star for the sinking of a Japanese cruiser and several merchant ships. The game features digitized interviews with Commander Gruner as he relates personal anecdotes and narration of technical and tactical matters of his vast experiences of the Silent Service.

Mr. Gruner began college at Cornell University in 1929, but due to the Great Depression was unable to continue beyond his freshman year. He was accepted into the Naval Academy at Annapolis in the summer of 1931. In the years leading up to WWII he served as a junior officer on battleships for two years and was on the staff of the Commander-in-Chief U.S. Fleet for a year. In January of 1939, he reported to fleet submarines and spent the next seven years serving as Executive Officer aboard the USS *Pike*, *Sunfish* and *Apogon* on 10 war patrols in the Pacific Theater. In 1944, he assumed command of the USS *Skate* for three patrols, which resulted in the sinking of the Japanese cruiser *Agano*, the destroyer *Usugumo* and several merchant ships. Among the missions available in *Silent Hunter* are scenarios based on Mr. Gruner's wartime achievements.

Mr. Gruner described the training a submarine crew and its commander underwent during WWII. When submarine commanders finished sub school in New London, CT, they were sent to the Attack Trainer in Pearl Harbor before beginning their first war patrol. While on war patrol, which would generally last

eight weeks, the crew would continue to train and prepare for combat. He said that the life of a submarine commander as depicted in the movies is not true to life. In fact, war movies don't rank high with Mr. Gruner. "War pictures generally fail to be accurate in depicting life in combat, which is 90% boredom and 10% terror," Gruner said.

When asked about the quality of *Silent Hunter*, Mr. Gruner remarked that he liked what he saw in the simulation while it was under development. "*Silent Hunter* has done an excellent job of bringing staunch realism to the product by using accurate data in depicting ship speed, movement, the torpe-

does and the submarine equipment, particularly the TDC and radar." Serving as a technical consultant for the project was Mr. Gruner's first involvement in computer games. He said that although he doesn't play computer games, he has used computers throughout his career. When asked how he became involved in the *Silent Hunter* project, Mr. Gruner told of the trail SSI followed to find this veteran of naval combat. While researching Japanese WWII ships, Kim Biscoe, commissioned by SSI to paint the detailed submarine featured on the box cover, telephoned Pacific Front Hobbies in Kirkland, Washington, expressing an interest in researching early WWII Japanese ships. Through a stroke of luck, the owner of the hobby store was Mr. Gruner's son, William. Mr. Biscoe's interest in speaking with some-

one who might have first hand knowledge of Japanese ships evoked a surprising and instantaneous response. The younger Gruner exclaimed that his father was a former U.S. Navy commander performing various submarine duties during WWII. When asked if he would mind lending some of his historical narratives and expertise to the development of the game, Mr. Gruner agreed. His first hand experiences and knowledge give a flavor of realism to this historical, comprehensive and feature packed WWII submarine simulator.

After Mr. Gruner left the Navy in 1947, he continued his involvement in critical U.S. Government projects. From 1949 to 1956, Mr. Gruner managed in the ASW Aircraft Design Requirements project at Lockheed Aircraft Corporation to determine the design requirements for both land and carrier based fixed-wing aircraft. These studies subsequently provided the basis for the design of the Navy P-3 and S-3 ASW aircraft manufactured by Lockheed. Other projects Mr. Gruner was involved in include the highly classified foreign satellite system, the military satellite system for Lockheed Missiles and Space Corporation and the Tomahawk Land Attack Missile, Communication System. Mr. Gruner's performance for Lockheed Missiles and Space Corporation on the Polaris Missile System program earned him a Certificate of Commendation from the Secretary of the Navy. When asked about his distinguished career, Mr. Gruner remarked, "Yeah, it kept me busy."

Breaking Open the Pipe
How Bigger Bandwidth "Plays Out"

by J.P. Withers

As you quietly slip around the corner, finger resting on the trigger of your assault rifle, a voice comes whispering out of the darkness.

"Iceman, I have a bead on you. Give up now."

You know it's noise. Darkheart always uses taunts to try to unhinge people. Worry

back." comes out of your PC speakers as the end of game screen appears on your monitor.

This kind of integration of sound with multiplayer gaming lurks right around the corner, along with a host of other goodies for those gamers who like using their modem. But like past promised technological innovations

current games support direct head-to-head competition in this manner, but there are drawbacks. One is only two people can play. Another is that you both need to be in a local area, or the long distance charges are going to run at least $6.00 an hour.

Local Area Networks (LAN) solve the number of player problems. Many games that support this kind of gaming allow 8 or more players to compete simultaneously at very smooth speeds. But again there are problems. First, all the players have to be in the same place to be connected to the LAN. Second, LANs are expensive pieces of gear, and only gamers who work or go to school at a place that has a LAN are able to play this way, assuming that the institution with the LAN doesn't ban mulitplayer games on it, which is a policy many businesses and educational institutions have chosen to enforce.

So the final solution is to connect via an online service, either a commercial service or the Internet. This solves the locality problem easily. Players on an online service can be spread across the nation. And since online hookups are almost always a local call, even with the average $3.00 an hour connect fees it is still cheaper than long distance.

Now as any Ace worth his salt knows, there still has to be a lurking doubt with all this, and there is: speed. The big bugbear when it comes to any of this is speed of communications. You see, a game has to send a certain amount of data across the wire to another computer in real-time for you to play a game. On most games, this isn't too much real info. For example, in Mechwarrior 2, by Activision, the game doesn't have to send a picture of the mech to the other computer, but it does have to tell your opponent what kind of mech you are in, the damage condition, the trajectory and type of anything you have fired recently and other such data. A constant
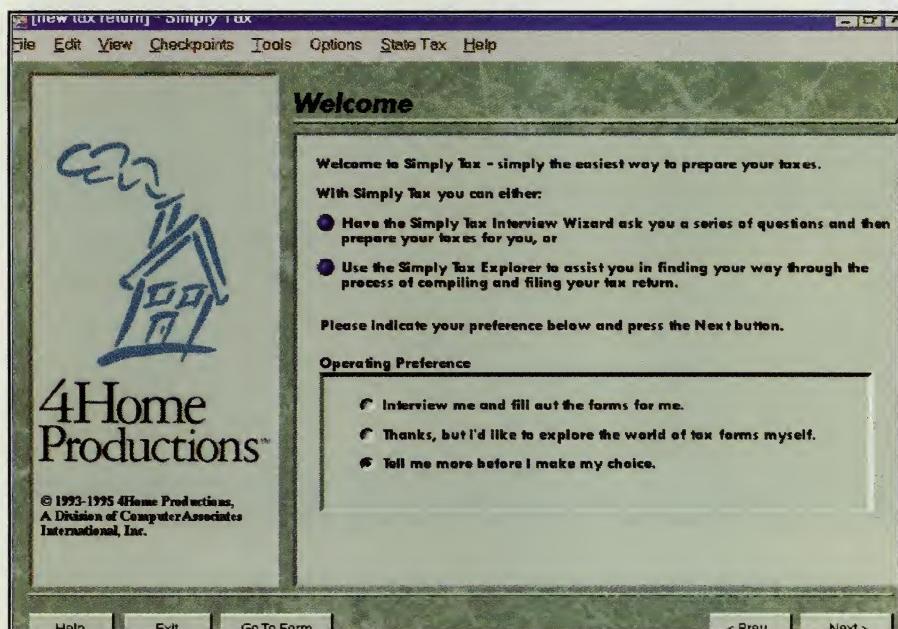
them into making a grossly unforgiving mistake, missing a noise or blowing a shot. You continue creeping down the edge of the room, moving sideways as you keep your back against the wall.

Then you hear just the faintest click off in the darkness to your right. You spin and fire. The muzzle flash of your gun lights up the dark corner and you see the blood blossom on Darkheart's chest as your rounds find their homes.

Unfortunately you hear a low laugh right behind you and blood clouds your vision as Darkheart's partner slips a knife into your ribs.

"Good try dude, but you need to watch your

in the industry, many players are a bit wary about the hype of higher bandwidth gaming. How long have we waited for the trumpeted VR experience only to be greeted by fuzzy head mount displays that cost too much and loser half-solutions like the crimson monster Virtualboy? With all of the noise that surrounds the real innovations, it isn't any wonder that the rank and file of the gamer community wants to see results before they get too excited by big promises of awesome online gaming experiences looming in their future.

There are three basic ways to do multiplayer gaming. The first is to direct dial a modem connection to another player. Many

stream of this data has to go back and forth for both computers to stay synchronized with the proper view. Each piece of data might not be that large, but there is plenty of it in a long stream.

The faster the communication between the machines playing the game, the more of this data that can transfer, and the faster and richer the gaming experience can be. For example, Mechwarrior and other current games can get away with fairly low communication speeds because all the images for the game aren't transmitted over the wire: they are stored in your computer. Hence the game already knows what every mech looks like from every angle, only the type of mech and facing information has to be transmitted for your computer to display the image.

But let's say that a game like Mechwarrior comes out, but it has a couple of major differences. One is that you can truly custom make a mech from the ground up. Every single element of your mech can be unique. And let's also say that you can paint it in your own custom pattern. Now your mech can look pretty different from anything stored as a full image in the game. Hence, the communication line has to now hold all the data it did before, but now it also has to transmit a great deal more data about the visual representation of your mech. And if there are a lot of players that can play at once, 8 or 16, then the communications requirements will go *way* up. And then you can also add voice transmission for those players who have sound cards with microphones. All of a sudden you are starting to get into more data than a slow and simple modem can handle.

And this is where we get into the exotic toys for high speed communications. The average modem today moves at 14.4 Kbaud, or 14,400 bits per second. That means the modem can move a compressed version of the Bible in about 45 minutes. Faster modems are coming standard on new machines that allow 28.8 Kbaud communications. That makes the Bible move in about 20 minutes.

In contrast, sending a television show in real-time to your computer would take around 3 million bits per second of speed. That's a Bible every five seconds for those of you keeping track on our Gideon Scale.

But wait a second, aren't a lot of different companies talking about running a fiber optic line into the home that will allow them to send

you digital TV on demand? Yes. And properly configured, this might be the real holy grail of gaming. Fiber optic lines operate at mind boggling speed by current gaming standards. The numbers are so high they are meaningless to all but the hard-core tech head. To quote Neal

Stephenson's book Snowcrash on fiber optic communication connections:

"To get the same amount of information on paper, they would have to arrange for a 747 cargo freighter packed with telephone books and encyclopedias to power-dive into their unit every couple of minutes, forever."

While this is a slight exaggeration, the 30+Mbaud connections of a fiber optical connection are more than fast enough to run two way video and still have plenty of bandwidth left over for other jobs.

This would be the real deal, a fiber optical connection to a high speed network that

jacked straight into the back of your computer, which by the time this is actually going to happen will most assuredly have a dedicated video processing system that can handle real-time video in and out without even breaking a sweat.

What will that bring us? Well, at this point we can only guess. The test systems already in place, such as the Time Warner interactive cable trials in Florida, don't place a high value on gaming.

However, to get an idea, we can look again to Neal Stephenson and his book Snowcrash, while Snowcrash is fiction, many of the leaders in the online gaming industry look at the book as something of a possible blueprint for the future. Kelton Flynn of Kesmai games and Daniel Goldman of the Total Entertainment Network both have read it and speak highly of Stephenson's vision of the future.

In Snowcrash, the communal online network is the Street. The Street is brought to users, through fiber optic connections, in such resolution that it is indistinguishable from looking at a picture or a movie. It is three dimensional, and users can walk around as avatars, custom bodies that look just like real people and with computer commands can change their expressions or perform most any human action. Full stereoscopic sound is also part of the package, hence when you talk, other users hear it, and

can also tell where you are standing from the sound of your voice.

In this universe, games take on many of the elements of reality. You can climb on a motorcycle and start racing it and you will see in picture perfect resolution of everything as it would look racing on a motorcycle. You could hear the wind rushing past your head. And you can do it at the same time as hundreds of other users in the same system. Natch for sword fighting or flying a fighter jet or anything else the human mind can imagine.

Does this sound like science fiction? Well, Snowcrash is science fiction, but the technology isn't. Every 18 months the computing power on the desktop roughly doubles. This is known as Moore's law and has held true through all of personal computing's short history. While some experts debate that there has to be an end somewhere in sight, most agree that at least two more doubling jumps can occur before we start getting into the physical limits of the chips.

This means that inside of five years, a common desktop computer will have the power of a Silicon Graphics workstation of today. More than enough juice to stream high quality video in and out without a problem and still do plenty of other work.

The high speed fiber optic connections are coming by 1999 if you believe the phone and cable consortiums that are competing to be the first to offer you the technology.

To those in the middle of the innovations, Snowcrash and the Street looks less like science fiction and more like the year after next.

Ah, but that is still then, when the hype of the potential catches up with the reality of the living room. What is out there right now or in the next few months that is taking advantage of the current technology of relatively fast modems, the Internet and other online connections and Pentium class power on the desktop?

One of the new offerings taking advantage of the latest in technology is the Total

Entertainment Network. Based in California, this new operation is offering multiplayer gaming both through local dialups in various cities and also by connecting though the Internet. TEN already has deals with 18 different developers, including Apogee and Maxis to offer interactive multiplayer gaming. The TEN system isn't fiber optic broadband, but current technology. They use a good half-step solution: CD-ROMs on the user's end store all the art and most of the code. So only a small amount of information really must travel between players.

While at roll out TEN will probably only have standard, point and click 2D interfaces, expect full 3D user environments in the near future.

"We don't want to offer 3D as the only way to get to things. Some people don't like full 3D environments for simple things like getting their mail. But the best way is to offer a choice. If people want to view everything in a virtual reality environment, then they can. We also are going to offer authoring tools that allow users to build their own 3D structures and environments and allow others to go there to play or just look around. We are looking at a number of different products and technologies to see which one is the best to implement these environments," says Daniel Goldman, the president of TEN.

Tetragon is offering a new host of online games, provided though the Microsoft Network. While the Tetragon games aren't the most elegant in the world at this juncture, being in the main ports from Tetragon's old interface, the Multiplayer Games Network, expect the next generation to take full advantage of the sound and other multimedia bells and whistles that MSN's interface offers.

And, of course, Kesmai's offerings, which have been perennial favorites for quite sometime on GEnie and CompuServe are still out there. With Mechwarrior and Air Warrior already under their belts, Kesmai boasts a large installed user base. But while interested in pursuing the new possibilities of broadband gaming, Kelton Flynn, Kesmai's president, offers an interesting perspective on all the hoopla of the new multimedia online future.

"We are spending plenty of time working on 3D offerings, such as Mechwarrior and Air Warrior, but do you know what continues to be our biggest draw? Island of Kesmai, a text

A VETERAN ASTRONAUT.

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interface game. The attention goes to the flashier games, but there are more users using Island of Kesmai. With the current state of the art. . . [in monitors and user interface] . . . it may be more powerful to allow users to visualize their own surroundings from text suggestions. And the text interfaces are much more flexible in the amount they allow the users to interact with the game and help change it," Flynn says.

However, there is another important text gaming forum in existence that is poised to change dramatically in the next few months due to improved communication technology, Internet MUDs. MUDs, the Multi User Dungeons of the Internet, are already, arguably, the most popular text based gaming offerings in the world: partly because they are cool and partly because they are free. However, there have already been attempts to marry the rich user command interface of MUDs with the graphical environment of the World Wide Web. While these efforts have had less than stellar results, they have shown the way for administrators and users when the next generation of Internet tools arrive,

and with the coming advent of VMRL and Java web protocols, which will offer much more flexible and powerful ways to represent 3D, game specific data over the net, expect visual MUD interfaces to come into their own.

And while it isn't a game the Virtual World interface being shown on the Net is another glimpse into the future. Virtual Worlds allows users to put on a body, or avatar, and walk around in a 3D environment interacting with other users. When you talk to another avatar, they see you and you see them. Expect this technology to soon be wedded to real-time audio so that avatars can directly speak to other avatars standing close enough.

So while the full implications of real broadband gaming are only speculation at this point, there are still plenty of places for gamers to go with today's technology and get a glimpse of the exciting possibilities. And for those already addicted to online gaming, plenty of new offerings are springing up, providing even more chances to digitally compete with other modem equipped Aces around the world.

Joining the Ministry

The Hottest new Mush Community for Gamers on the Fringe

Monolithic skyscrapers, bizarre, praeterhuman sculpture, miles of city streets, crammed with shops and galleries, oddities, and objects d'horreur. A secret sleeping beneath the city, slumbering but growing ever more hungry for light and life. A city lost in time and space, surrounded by an endless black desert under a blood-red sky. Welcome to Carcosa, a gothic canvas on which you will create layer upon layer of dark digital experience. Interact with individuals from a variety of backgrounds, who share a taste for the dark and the introspective. Communicate with representatives from an eclectic assortment of online and off-line groups, through our expanding embassy network. Experience the unique and intense virtual space that is The Ministry, offered up in 32 bit prose and destined to become the postmodern community of choice for the online prophets of a new eon.

The Ministry is to be no ordinary MUSH (Multi-User Simulated Hallucination), with vampires or Imperial Stormtroopers running about killing each other. The Ministry is to be living space for the fringe; occultists, self-proclaimed social scientists, independent thinkers, 'Goths', freaks of all denominations, individuals of all sorts. We will provide a place for free association, information storage and exchange, and social intermingling within the familiar context of a MUSH-based environment.

One of the most important aspects of this vision are the Embassies. Various virtual communities and groups have been invited to build Embassies within Carcosa, to serve as interactive information centers or even recruitment areas. The existence of these Embassies within a shared environment will also, hopefully, engender understanding and communication between these individual communities and groups.

As for the gaming aspect of the site, there are 12 interactive 'mini-quests'.

The mini-quests are structured to reveal certain aspects of the city, such as history, the sewers, hidden secrets, things you wouldn't otherwise encounter. Gameplay here is very similar to the normal D&D genre, the following are four examples of situations one might encounter:

1.) A player might have to talk to a beggar in order to get the key so you can unlock the door hidden behind the large statue in the park.

2.) Rooms can be rented at the local Hotel, 'Seraphim Arms'. Rent is a flat rate, if you don't keep up your payments, the hotel 'bouncer' will come and evict you.

3.) Players can interact with NPCs (non-player characters) like Zero, the neurotic bartender of the Aegyptus. Zero can talk philosophy if your in the mood however if you become belligerent, the drinks become less tasteful, as does his prose.

4.) Alley way murders. Interaction with random criminals. Such a situation has multiple possible outcomes. A player might encounter a mugger, in which case, he kills you, leaves you alone, or rolls you according to your actions.

Currently The Ministry has 157 interactive robots, approximately 120 of these are geared towards the mini-quests and general ambiance. Robots are AI controlled NPCs, like the mugger above, with which users can freely interact. Robots handle many of the jobs a human DM would normally do such as being a doorman or tour guide. These bits of code allow the establishments to be populated by employees and important events to take place with little or no human oversight. Look for more sites like the Ministry to redefine the face of gaming on the Internet.

The Ministry can only be experienced at www.happypuppy.com

Great Naval Battles IV
Burning Steel, 1939-1942

by Ed Dille

The torpedo lifted the proud old greyhound out of the water and broke her back effortlessly. A few crew members lived long enough to comprehend, at least on a subliminal level, that a streaking silver fish had wrought this sudden conflagration. The men trapped in the forward compartments were, perhaps, the most unfortunate, as the blast knocked the superstructure askew and the resulting unbalance dragged the barnacle clad belly of the ship skyward. Denied the privilege of dying together, small knots of survivors struggled and hoped for nearly an hour in the watertight tomb until, mercifully, the hulk slid beneath the waves in search of a final resting place. Amazingly, the aft portion of the ship and its occupants emerged relatively unscathed by the ordeal. Defiant to the end, they even managed to fire several rounds from the one remaining functional gun mount at their retiring foes.

War at sea is unforgiving. Each engagement tends to be more decisive and have greater impact on individual unit integrity than other forms of conflict. Naval Surface warfare is a unique art form, which differs vastly from the other military disciplines. Much of what is known today stems from the lessons of the Second World War, particularly with regard to carrier based aviation. To understand what sets Surface warfare apart, regardless of the time period under discussion, consider the following line of reasoning.

Aviators only have to worry about other aviators and ground based anti-aircraft fire. Moreover, as a rule, they are strapped into sleek speedy airframes that can get them out of trouble as quickly as they got into it. Ground pounders face a double threat: enemy air power and other ground troops. They can't run away as fast as their airborne brothers, but they

can hide. In fact, the single most important factor in ground combat is always the proper use of terrain and topographical features.

Practitioners of naval warfare enjoy no such luxuries. It takes a long time to "steam" to the area of operations at school-bus speeds of 30-35 miles per hour and, once you are on station in hostile waters, it is not a quick trip back to safety. You are pretty much playing for keeps; hence the earlier comment

toe-to-toe, or broadside to broadside if you will, is what *Great Naval Battles IV* (GNB4) is all about.

GNB4 deals with an expanded version of the operations depicted in the original *Great Naval Battles: North Atlantic 1939-43*, which is the game that launched the entire series. The major differences include a larger order

Lock and Load, GNB style!

about the decisive nature of such combat. Moreover, you're completely exposed on a relatively flat, reflective surface, so that anyone who *really* wants to find you can eventually do so. You can't run and you can't hide. What you can do is try and find the other guy first and get in a good first lick if possible but, during WWII, it was almost always necessary to still go toe-to-toe to finish the job. Going

of battle on both sides and an expanded area of operations. Axis forces now include the German, Italian and French navies, not just the Kriegsmarine as before, while U.S., British and Soviet ships are available on the Allied side. As for the geography, GNB4 adds the Barents Sea, Mediterranean and the English channel to the previous mix, the latter being a very critical chokepoint for naval

traffic in the European theater of operations, then and now.

GNB4 comes with 13 scenarios from the period 1939-1943 (despite the end date of 1942 in the title) and four campaigns. Both historical and hypothetical scenarios are included. The former category includes, among others, the Battle of the Denmark Straights, where the *Bismark* and *Prinz Eugen* were caught attempting to break out into the Atlantic to raid commerce by the *Hood, Prince of Wales, Norfolk* and *Suffolk*; the Battle of the River Plate, where the *Graf Spee* was caught off the coast of Uruguay by the *Exeter, Ajax* and *Achilles*; and the infrequently modeled Battle of Matapan, where a British battlegroup built around the aircraft carrier *Formidable* countered the sortie of the entire Italian fleet in March of 1941. Revisiting these engagements within the context of the upgraded GNB4 engine is wonderful, but still not as fun as exploring some of the hypothetical designs included in the package.

For example, after the fall of France, the British destroyed the French fleet rather than letting it fall into Axis hands. What if the French had been ready and waiting for this attack, and sallied forth to meet the British. This hypothetical contingency is explored in the *Oran* scenario. Another great one that players will have a lot of fun with is *Gibralter*. In this scenario design, the Italian and Vichy French navies unite around the aircraft carrier *Bearn* to attempt an amphibious assault on the infamous rock. Opposing their combined effort are two British task forces, centered on the aircraft carriers *Hermes* and *Formidable* respectively. Granted, it would still have been nice to have been able to pick and choose individual or small group match ups out of the respective orders of battle, but the full bore brouhaha's represented in the hypothetical scenarios SSI did include are great fun to play.

The campaigns are all hypothetical but, before we explore each of them, it is first important to understand how the word campaign is used in GNB4, which does differ from the normal context with which most players have become accustomed. Normally, campaigns refer to lengthy periods of operation within a fixed geographical area to achieve a fixed set of objectives. To achieve those objectives, what results is a series of engagements spanning months or, in some

Torpedoes away! The usual crisp and clear GNB graphics are present.

cases, even years. The campaigns in GNB4, by comparison, range in length from 10 to 21 days. As such, they would be normally referred to as operations in the proper military lexicon. With that clarified, let's turn our attentions to the focus of these "campaigns."

Jutland '40 explores an alternative approach to the Luftwaffe's failure to achieve air superiority in the Battle of Britain. The Germans turn to the Kriegsmarine to cripple England and, with the help of the Vichy

The English Channel, hot spot in the early war years.

French fleet, they hope to fare better than they did in 1914.

The island of Malta served as a major supply port for Allied operations in North Africa. The *Operation Mercury* campaign represents an Axis attempt to eliminate this thorn from General Rommel's side using the Italian navy with support from the Luftwaffe.

The *Black Sea* campaign presupposes a series of engagements between the combined French/Italian fleet and the Soviet fleet, bol-

stered by survivors of the British Mediterranean fleet. These operations occur concurrent with the Wermacht's push through southern Russia on land and, with the Axis in firm control of the Med, the Turks have joined them and provided a base in Istanbul.

The final campaign is a juicy one that has been explored in many different games; *Operation Sealion*. This hypothetical campaign pits the forces of the Kriegsmarine against the Royal Navy in a winner-take-all

Surface combat gets intense nearing the English coast

match to decide the fate of the British Isles. Operation Sealion would have been the logical result had the RAF lost the Battle of Britain to the Luftwaffe and, during this campaign, the Germans enjoy air superiority in the form of air cover flying out of the forward bases in France.

Given the size and quality of the scenario/campaign package, there are obviously a lot of tactical alternatives available for exploration for those players willing to invest

the time. Further, replay value does not stop there either. SSI has also included a random scenario generator, which goes a long way to preserving the "fog of war" once players have become intimate with the pre-designed group of engagements. The question of whether or not players *will* invest that time however, remains. Here are the facts that both veterans

Air elements are useful in the escort /observation roles.

of the series and new recruits need to know to make that decision.

Earlier titles in the series were criticized for the number of bugs that remained after release of the final product and even the initial patches. In fact, the version 1.2 patch for GNB3 appeared concurrent with the release of GNB4. Thankfully, the ACE staff can report that GNB4 appears to be much cleaner than its predecessors in testing so far.

The upgraded engine takes advantage of advances in CPU technology and virtual memory manipulation as well. Even in the extremely crowded scenarios, with almost 100 ships and all associated aircraft and shells in flight being updated in real time (or even 3x time), things didn't bog down once on a Pentium 75 Mhz platform with a base 8 Meg of RAM. That demonstrates that the SSI design team has come a long way technically from past efforts and it allows players to focus on the game, not system performance, which is crucial.

In order to keep the speed up, however, there had to be some design decisions made that may not be acceptable to all players. Take the interaction between the ballistic and damage control models, for example. The best engine ever included in a game for these functions was the one contained in *Action Stations*, a little known title developed by Alan Zimm (a real world Naval Officer) and distributed by RAW Entertainment. The following comparisons will help illustrate the design trade offs that have been made in GNB4.

In the *Action Stations* ballistic model, once a hit is determined, the angle of the fall of the shell is calculated; one of forty-two distinct zones is determined to be the most probable hit location; armor penetration is calculated in accordance with zone and shell type, and all of this is factored against an accurate historical dud rate for that ammo. Even duds can inflict shock and penetration damage, however, and the location of all hits should have logical consequences to the affected areas. To do so accurately, the program must contain actually schematic data on every ship class and resolve that data for blast and penetration damage based on what the space hit, and the surrounding spaces actually contained. In other words, if a cable-way that controlled the ships gyro passed through the space destroyed, even though that compartment was halfway between engineering and the bridge, the gyro goes out when the damage occurs. *Action Stations* got down to that wonderfully anal level of detail, but it was SLOW executing each turn because of it. GNB4 doesn't even come close to that level of accuracy or detail in terms of ballistic resolution, but it plays much better in real time. Each design approach is fine, provided that players know what they are getting coming into the deal.

As for Damage Control, let's take a real world perspective for a moment. Based upon the location of fires, magazines might have to be flooded, spaces adjacent to the fires might have to be evacuated (leading to temporary loss of the facilities in those spaces) until the fire is extinguished. If left unchecked, fires will spread progressively, and so will floods if watertight integrity is not maintained. Further, when flooding occurs on one side of the ship, counter-flooding is necessary to maintain trim and continue to fight the ship (otherwise, gun elevation angles become an issue). Also, in the real world, discerning commanders have the option to cease firing and pull gun crews off to assist in the damage control effort. Again, *Action Stations* literally wallows in all the real world detail, while GNB4 sloughs it off in favor of a more enjoyable (depending on one's point of view) and certainly more manageable game mechanic. Yes, there are progressive floods and fires in GNB4 but one need only watch the DC teams in action to see that this is a much

more basic, randomized model than the one just described.

Finally, though the AI routines for gunnery and torpedo attack resolution do seem improved over their predecessors, it is impossible to escape manual intervention when something critical really needs to get done. As such, there is some blurring

Damage analysis is handled in easy to read graphics.

between the product's appeal to macro and micro-managers alike, but chances are that the former will like it better in the long run. Of greatest importance, however, is recognition of the clear effort SSI has put forth to "finally get it right" in the latest installment of the GNB engine. Some things do get better with age after all.

P C ACE

★ SKUNK WORKS ★

I Have No Mouth, and I Must Scream

by Bernard Dy

While much has been said about the merging of movies and computer games, little is made of the relationship between games and literature. There have been some attempts to cross the two in the past (Dune, Ringworld, Megafortress), and more pending, but none quite like Cyberdreams' I

Have No Mouth, and I Must Scream (*IHNMAIMS*). It is rare to see an author take more than a passing role in the development of the software. Gamers certainly are no strangers to the disappointment of celebrity endorsed titles.

Harlan Ellison worked very closely with the designers of this interactive adaptation of his work, and also consulted extensively on the development. As a result of this involve-

ment, players will find that the dialog is a refreshing jolt from the usual pomp filling the super hero worlds of fantasy role-playing and most adventure games. Ellison's cutting edge is clearly detectable.

The game's plot is related to, rather than a straight adaptation of, the original story. In

the original, five humans are imprisoned by a super computer known as AM. AM keeps the humans alive because it enjoys torturing them. In the game, players will play each of the five characters in separate mini-adventures designed to introduce elements of each personality not described in the original story. In this respect, the game retains appeal even to those who are intimate with the original source material.

The interface resembles a standard SIERRA- style graphic adventure. One can select from a list of verbs and apply it to objects on the screen. This is functional, but don't expect too much from the engine.

The mood is very dark and creepy, and there are definitely some scenes intended only for more mature gamers. Most scenes are void of other characters, so the focus is on the particular character the player is controlling. One interesting touch is a built-in hint system. A book in the player's inventory is titled "psychological profile", and reading it offers hints.

As for complaints, the largest is that one is often without any direction other than the generic goal of escape. As with many games, exploration will reveal some pointers. However, some meaningful preface to each character's track might help inspire gamers. Perhaps the final product, which will be reviewed in a future issue, will address some of these concerns.

It is ultimately Ellison's writing in the game which makes it unique. The characters must each overcome fears or recognize flaws in order to continue their quest to be free of AM. This effort on the part of the designers to honor Ellison's request that *IHNMAIMS* not be a mindless game is commendable.

Never Say Never

Who would have believed Harlan Ellison would ever agree to allow development of a computer game based on his work? If you've followed Ellison's work, you know he's no fan of video or computer games. He once wrote an essay blasting Activision's *Empire Strikes Back* game (an Atari 2600 cartridge).

He still dislikes computer games. "I do not like video games, I do not like computer

reach around back there at the rear of the top-most shelf in the dark with the cobwebs and the spider goochies and pull out that mason jar full of hard, nasty, petrified chick peas, and strain and sweat to get the top off the jar til I get it open, and then take several of those chick peas and shove them up my nose. Never tell me not to do that because, as sure as birds gotta swim and fish gotta fly, when you come back home you will find me lying stretched out, blue as a Duke Ellington sonata, dead cold with beans or peas or lentils or chick peas up my snout.

Or, as Oscar Wilde put it, *"I couldn't help it, I can resist everything except temptation."*

games, I do not like arcade games, I think they're a terrible waste of time." Now, Ellison has worked on a computer game. Why the change in heart? Ellison admits he may have contradicted his words, but he knows he has learned and changed in the years since he wrote the Activision essay.

Ellison believes the genre may have potential. "Anything has merits as a medium. I don't rule out the chance that there's gonna be a Monet, or an Andy Warhol, or a Francis Ford Coppola out there somewhere, who even now, as we speak, is figuring out some way to turn the art potential of the computer into a supportable medium. It's bound to happen. The human mind is capable of anything."

He humbly believes *IHNMAIMS* may not be the exemplar of this medium. "Whether or not I did it, that is, create the greatest computer game in the universe, is unlikely, because I ain't that smart." While some of Ellison's inspiration to work on the game came from a desire to learn, most of it was from the project proposal, presented cleverly by CYBERDREAMS. He recalls the story in his distinct style.

"Cyberdreams came to me and they offered vast sums of money to do this game and I said that that had about as much appeal for me as spending an evening discussing the relative merits of butcher knives with O.J. Simpson. So then they said, well, you've never done this sort of thing, so maybe it is that you *can't* do this sort of thing, maybe...you are not capable.

"*Never* tell me not to go get a tall ladder, and climb it, and open the tippy top-most kitchen cabinet in my mommy's larder and

Peeking into the Pandora Directive

by Steve Kent

The Game

We all know about Pandora's box (stop sniggering). She couldn't resist taking a peak and all the Evils in the world were unleashed. So Pandora was a bad choice to guard the box; how about trusting it to a bumbling out-of-work private eye/dance instructor in the year 2043?

That's the spin that Access uses to launch Tex (*Under A Killing Moon*) Murphy's latest adventure. The original 1993 interactive movie sold over 400,000 copies, and the sequel pits Tex' intellectual ability, athletic prowess, and dumb luck against brutal killers from the National Security Agency in a race to discover the truth about UFOs in Roswell, New Mexico. The *X Files*-like case begins with Murphy (played once again by auteur Chris Jones) being hired by a beautiful and mysterious woman (ex-*Charlie's Angels* actress Tanya Roberts) to look into her dad's Mysterious Research Papers, find the cool stuff, and share in the bootie.

Murphy's investigation leads inevitably to Roswell, the location of the most controversial UFO sighting of all time. According to many sources, military pilots found a crashed UFO near Roswell on July 6, 1947. Though the official story is that the object was a hot air balloon, many people still maintain that military scientists obtained and performed autopsies on the bodies of one of three dead aliens.

Describing the rest of the story is next to impossible—which is good news on the interactivity front. As the case progresses, Murphy can choose three paths to follow. All of the paths lead to a confrontation with the National Security Agency and introduce him to a cast of characters including Archie, the UFO expert. Each path has a unique storyline, and characters that are killed along one path survive on another.

Behind the Scenes

Though he's never seen on screen, Australian director Adrian Carr made a crucial

contribution to *The Pandora Directive*. Chris Jones directed *Under a Killing Moon,* but relinquished the chair to seasoned film director Carr for the $4 million sequel.

Carr, whose list of credits/liabilities includes directing the first year of the Power Rangers TV show, brought both experience and vision to the project. The filming took place in Access Software's bluescreen studio in Salt Lake City, Utah, with Carr not only running the studio and managing the actors, but also performing journeyman cinematographer duties, blocking out camera angles and structuring the game's plot dynamic.
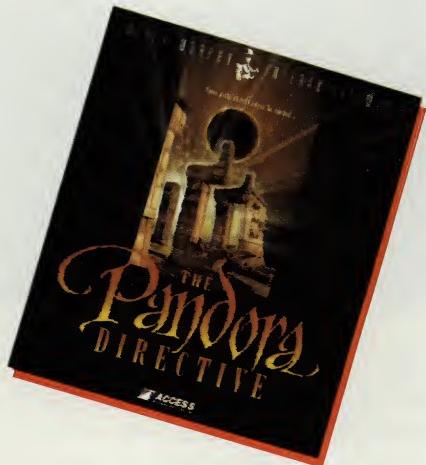
"Adrian was a pleasure," says Tanya Roberts. "He had never done a CD-ROM and he was learning as he was going. He had his hands full, but he was terrific."

According to Aaron Conners, writer of both *Under a Killing Moon* and *The Pandora Directive*, Carr was lead man on the production side. "Watching Adrian with this project is like someone who has only had TV dinners heated up in a microwave [suddenly having access to].a gourmet meal prepared by a master chef."

Except for Access employees, such as Chris Jones, none of the cast came to the party with much multimedia experience, though superfox Tanya Roberts scores minor points for sharing a Macintosh with her screenwriter husband (Access sent her a copy of *Under a Killing Moon,* but it requires a multimedia-ready PC, so she loaned it to a friend, who moved away before showing it to her).

Barry Corbin, who plays a murderous officer of the National Security Agency, makes jokes about his inexperience with computers. Asked if he will play *The Pandora Directive* when it is completed, Corbin says that while he's unlikely to play the adventure game, he probably will watch it. "When we get this done, I'll probably have one of my kids show [it to] me."

Why won't he play it himself? Corbin admits a slight ignorance when it comes to computers. "I wouldn't know how to turn one

on. I know what they [CDs] are, I mean, I'm living in this century."

Best known as the ex-astronaut on *Northern Exposure*, Corbin does not plan to become computer-literate. When Access gave him a copy of *Under a Killing Moon*, he gave it to his son, a gaming enthusiast, and asked if he should act in the sequel. "Some of my best roles came when I ask my kids if I should take a part. I had my son play *Under a Killing Moon*, and he liked it."

When it comes to using computers, Corbin says he's simply not interested. "I really don't have time to learn anything new. I started to write with a computer at one time, I got some kind of program-I don't know what it was."

"I couldn't figure that thing out. I started typing on it and the words would finish up over here and start over there. [Corbin point-ed in several directions around the room as he said this.] I just said to hell with it and threw it away and got myself a typewriter. I still use a typewriter for writing."

Fortunately, the rest of us will probably be a bit ahead of Corbin.

Bluescreen Backnotes

If the cast of *The Pandora Directive* is a bit shy of A-List quality, it doesn't lack for cult cred. In addition to her *Charlie's Angels* pedigree, Tanya Roberts was James Bond's love interest in *From a View to a Kill*. And, though he generally plays character roles, Barry Corbin's career is still in full swing. His best work includes roles in *Northern Exposure* and *Lonesome Dove*. Veteran actors John Agar (former WWII hero, ex-hubby of Shirley Temple and star of such psychotronic classics as *Brain from Planet Arous*) and Kevin McCarthy (from the original *Invasion of the Body Snatchers*, Joe Dante's *Piranha* give the project a great mondo bizarro appeal.

According to Christine McGregor at Access, Hollywood is still not sure what to make of interactive movies. "Up until recently, SAG (Screen Actors Guild) didn't even have an interactive contract. On a film, if I were going out to get an actor, I would have a ballpark figure on what they're going to make. Of course, on a film you're negotiating two months of filming and probably a little post-production time and a little pre-production time. On this, you may need a name actor and they may be playing the lead, but you only need them for four days. You can shoot everything you need in four days.

"Now the agent has to rethink which way to structure the deals. Is an actor worth $5 million because they're in the project, or is that pro-rated to the amount of time they work? This is a huge argument. If the actor is worth $1 million, he's worth $1 million because putting his name on the box is going to sell many more copies of your game."

Money is not the only issue keeping actors out of interactive movies. Many actors have expressed hesitation about playing roles in CD games because they think it will hurt their careers. The fact that most actors appearing in CD movies are experiencing slumps in their careers only adds to the fear.

Corbin says this is not the first time a new medium has frightened actors. "There were a number of actors at one time who were afraid to do movies because they were afraid it would hurt their career. There were a number of actors who were afraid to do television because they were afraid it would hurt their career [and so on].

"Edward G. Robinson did a commercial for Folgers Coffee. Up until that time, no star had done a commercial. He did it, and everybody realized it didn't hurt his career. As a matter of fact, coffee sales went up and his career got a little bit of a boost, too."
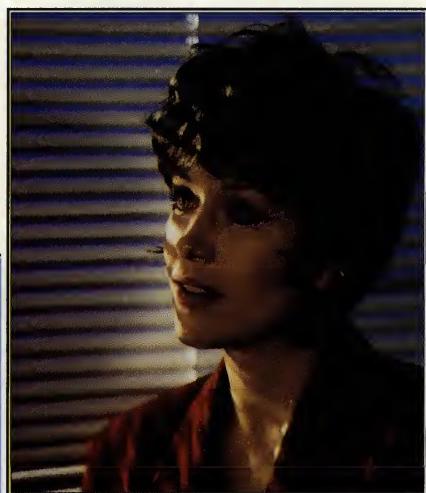
In any case, the Pandora project will help establish whether games can create their own movie-style franchises.

Pass the popcorn and don't get any in my mouse!

Warcraft II:
Return to Azeroth

by Eric Morman

Mortal enemies face off once more on a new continent.

The lands of Azeroth lie in ruins, overrun and plundered by the Orcish Hordes which poured through the dark portal near Castle Stormwind. The few surviving humans, led by Sir Anduin Lothar, had no choice but to flee across the Great Sea to the shores of Lordaeron, bringing tragic news of impending doom to the sovereign nations of that continent. United for the first time with Elves, Dwarves, and Gnomes under one banner, the Alliance had precious little time to prepare for the coming darkness. Small raiding parties were already landing, and with the inevitable arrival of thousands more, every available resource was required to produce weapons and defenses. Soon, the lands of Lordaeron would see the greatest battle of its long history, and the victor would emerge as ruler of what little remained.

Warcraft II from Blizzard uses the original game concept, and builds a vastly improved game engine around it. New features include: SVGA graphics; a simpler command interface; new buildings, units, and missions; a more intuitive computer enemy AI; a scenario editor; and best of all, network play for eight. These improvements make it less of a mere sequel, and more like an entirely new game.

In addition to the rich detail and animation in the high resolution Vesa format, the mouse command interface features tagging of up to nine units, and one click orders for movement and attack without having to go to the icon sidebar. This allows much faster execution of orders, which is fortunate since the number and diversity of units increases with each mission. The opposition gets new toys as well through the campaign, leaving very little time to stand around. The map is not only uncharted at the beginning of each mission, but a "fog of war" option causes mapped areas to remain dimly on the map, while enemy units cannot be spotted until they come within visual range of your own units. To help balance this disadvantage, mobile units have a new command icon that allow users to order them to patrol between two points. Watch tower structures are also available to keep an eye on an area. During play, the fog of war actually helps spot friendly units scattered on the map, since each has a brighter circle of visibility around them.

The new naval and air units introduce entirely new strategic elements, especially since flying dissolves all previous movement barriers. Additional oil resource requirements make the more powerful navasl vessels, such as the Human Battleship and the Ogre Juggernaut, very costly and time consuming to produce. However, water travel opens yet another theater of war, since ship's cannons can pelt shore units within their range, and transports allow amphibious landings. Coupled with air transports and attack units such as Gryphon Riders and Dragons, battles become very complicated and unpredictable when compared to the long marches in the first version.

These new aspects of war called for an improved enemy AI, which has been a primary focus of the development team at Blizzard. Players will find the computer a worthy adversary rather than something to pound on. It takes note of player actions and adapts its tactics, sending units the long way around to strike from the flank or rear, or conducting focused attacks on single and weaker units of importance. Every effort was made to create intuitive and logical routines to control units

Call in air support with dragons.

plete with options to send messages to single or multiple players, and to form non-aggression pacts. This latter improvement prevents players from attacking allies until breaking the pact, which encourages backstabbing and skullduggery as a means of attaining victory. Since both parties must enable the alliance option individually, either can break it and attack the other at any time, leaving the defender helpless for a few seconds until they dissolve the treaty on their end.

Overall, *Warcraft II* delivers one of the most strategically diverse games in its genre, with endless replay value through the scenario editor, longer campaigns, and network wars to draw in players and keep them there. New players can dive right in without any previous experience with the engine, and veterans will immediately appreciate the genuine improvements. Warning: Expect redeye and loss of sleep. Turn on the answering machine. Tip the pizza dude for keeping you fed. And most impor-

and villages on either side of the war. This attention to detail creates a few disadvantages for the computer as well, since their villages operate the same as any other, and require local resources to continue producing units. In the earlier version, an enemy structure spit out products on a timer, regardless of resources or structure prerequisites. In the new build, players can wage a war of attrition on a computer enemy by taking out key structures, killing their workers, or guarding a mine. However, players cannot expect these tactics to work consistently since the enemy will not stand idle and watch it happen.

For single players, the game includes fourteen missions each for the Human Alliance and the Orcish Horde, with four additional Veteran missions to challenge the most battle-hardened warrior. In addition to the campaigns, the new scenario editor allows players to create missions of their own design and run them, providing unlimited replay value. Inside the editor, players have complete control of every detail for up to eight contestants, Horde or Alliance, with the option to set computer players as passive or active allies of their respective side.

The real jewel of the game, though, is the ability to use edited scenarios in modem/serial or IPX network battles. Up to eight human or computer opponents can terrorize each other in an advanced multiplayer environment, com-

Bring ships closer to shore and pelt land targets.
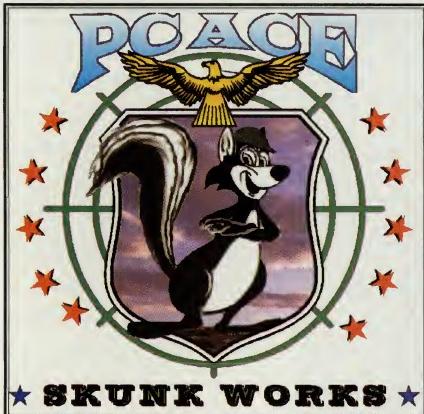
Getting Ripped:

A Preview of Take 2 Interactive's New Project: Ripper

The interactive story genre offers mixed blessings. These games offer stunning graphics as a given, but playability is not always where it should be. Perfect example: *Quantum Gate*, an excellent interactive movie, but it offerered less game play than a virtual tour of the art galleries of Europe.

To some extent, Take 2 has suffered from this syndrome. *Hell: A CyberpunkThriller* was marked by excellent graphics and a deep, mature story line, but it was also burdened with a clumsy combat system. Instead of allowing interactive combat, the game only permitted the player to solve puzzles which, in turn, generated some canned combat sequences. Solve the puzzle and the player gets to watch a pre-

selected film clip as a reward. Screw up, and a non-interactive death sequence is run. All-in-all, a somewhat less-than-optimal process.

Take 2 also brought us *Bureau 13*, another disappointing game spun off from a potentially stellar license, but the publisher is still sticking to its vision. In fact, it's now upping the ante with an extremely ambitious project that combines full motion video, star power and a deep backstory to hit that big home run with the much-ballyhooed *Ripper*.

Ripper is set in New York, circa 2046, where Jake Quinlan, a crime reporter covering a string of bizarre murders gets sucked into an investigation that leads him further and further into the prototypical private eye environment.

Searching for clues, a chain of evidence leads Quinlan to a hideous but inescapable conclusion: somehow, Jack the Ripper is stalking New York in the 22nd century.

The gamer plays the role of Quinlan, the investigator who collects clues as the body count rises. Quinlan is in a race against time in the quest to figure out who the Ripper is, and how he or she is committing the gruesome string of murders, leaving behind a trail of nearly vaporous clues.

The journey to solving the strange crimes leads to a plot far deeper than the average computer game. Before things are done, Quinlan will have to travel across New York City and at the same time across cyberspace.

As the game progresses, Quinlan encounters a strange cast of characters who drop clues to solving the puzzle. But time starts running out when the Ripper targets Quinlan's girlfriend and, ultimately, Quinlan himself. It becomes a race against time to unmask the Ripper before Quinlan becomes another victim of the crime of the century.

Instead of massaging computer graphics and actor voice-overs as in past projects, Take 2 has gone fully digital video for *Ripper*. The video production took place in New York, and pulled in an A-List of experienced actors and stars, including Christoper Walken, Burgess Meridith, John Rhys-Davies (who has one killer cyber-agent, finding spots in a zillion such projects), and other artists with cred.

PC Ace journeyed to New York to view the edited footage as

Will users have the stomach for Ripper's sharp blade?

it was being shot, and the tech quality looked hot. The edited scenes bore less in common with a video game than with a high quality television production-*Strange Luck* on cyberpunk steroids. The live action filming is seamlessly integrated with high quality rendered backgrounds to produce a moody, believable look that easily evokes the project's dark cyberpunk/gothic vibe.

Then there's the soundtrack, which is going to include, among other artists, *Blue Oyster Cult* (don't fear the Ripper?).

Next up: the storyline, which is where one of the classic strengths of the Take 2 production team comes into play. Take 2 can take some hits, but weak storylines is not one of them. *Hell* had a hot enough plot that it survived translation into a novel, and even *Star Crusader* offered a *Wing Commander*-level understory. With *Ripper,* the creative team headed up by veteran designer/producer F.J. Lennon has pulled out all the stops. "This is really the most ambitious story we have done," he declared. "We worked hard to produce an excellent and believable picture of the future from the script.

"The script was a real combined effort from [the] three writers who worked on it. We sat for a couple of months in a room working on it, pondering on it. We even acted it out. There was a great deal of focus on keeping the characters consistent in their actions and lines.

"We also looked at a lot of movies [which] we felt were effective in creating the same feeling we were trying to get with *Ripper*. Then we timed the scenes and dialog and generally tore them apart to see how they worked. Finally we had a pro script writer working on the script to polish it. This was generally a huge team effort, and we think it shows."

Ripper offers a story line that is mature in nature – even by the standards of Hell. The language of the characters and deep visceral issues definitely move it out of the realm of kiddie entertainment. And Lennon is aware that this might cause some problems.

"There hasn't been anything done like this yet. This is equivalent to an R-rated movie. And no one in gaming has really crossed that line yet. This is a gritty story with gritty characters who use gritty language. We didn't do it for shock factor, or to push the envelope, but we see certain characters talking in certain

Will Christopher Walken and other Hollywood names draw users to the digital box office?

ways, so to stay true to the story and characters we couldn't be afraid to use adult content.

"But sure, I am a little nervous about it. I mean, CompUSA pulled *Phantasmagoria* from their shelves, and it doesn't have the kind of language we have."

Okay, we're now past script issues. Back at the game, we have the usual Multiple Endings (they used to call this stuff Twist-a-Plot when it was used in kiddie books). The game ships on four CDs and the first two contain enough information to give the player background common to all four endings, while the last two CDs play out differently depending on how often a gamer chooses to play them.

"We aren't really worried about the multiple endings. This might not be something that works well on film, but that isn't the same thing as a game. The nature of good interactive games is various endings and branchings and twists. We worked hard to make all of the endings consistent, different and surprising. We don't think anyone is going to be disappointed with the multiple endings."

In additon to the video and scripting efforts, Take 2 did a lot of work on the programming engine to make sure it gives players the maximum chance to get lost in the game.

For instance, on the fly video resolution switching is used to allow zooming in on a

point of interest. Where in past Take 2 games getting a closeup view of a puzzle such as a lock would require loading a new visual, now the player clicks on the object of interest and it zooms to fill the screen without a noticable break in game continuity.

The game engine was also built from the ground up to provide the designers direct control over the engine, instead of having to work though the programming team to implement changes. The designers script all elements of the game directly in a simplified language, and then a custom designed compiler implements the new changes without requiring changing the actual programming code in the engine of the game. The hope is that this direct control will help the designers keep the final product true to their origninal vision.

Bottom line: the demos and footage *PC Ace* has seen makes us believe that Lennon and Take 2 have reason to feel positive. The movement engine is clean, the video segments are great and the project is backed by a solid script. Ultimate question: can *Ripper* make a killing in the cyberverse?

Expected to be ready for a 1st quarter 96 release, only a few months on the shelves will prove it's worth, but if we had to make a wager, it would be a good bet that Ripper is going to make a killing.

P C ACE

★ SKUNK WORKS ★

Top Gun
Reviving the Movie

by Vince Alonso
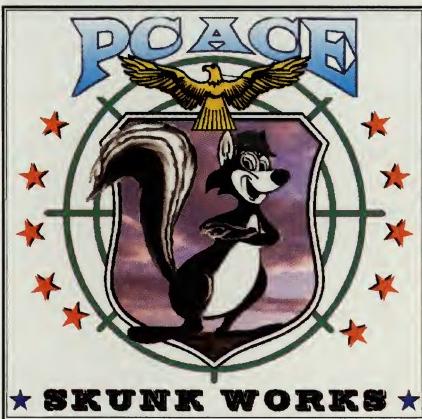
Since the release of *Falcon 3.0* in late 1991, no single producer has managed to

Virtual Cockpit view: On the catapult ready to launch, you padlock your wingman to the right. Squadron markings are clearly visible.

ited to the basic digital selections. Unfortunately, Spectrum Holobyte is follow-

will be accompanying him to *Top Gun* at Miramar. The state-of-the-art video clips require a small video window on anything other than a fast Pentium to avoid significant loss of video quality.

Presented with the main menu screen, an innovative cursor replicating a lead computing gunsight lets you choose from the main game or instant action mode. For a quick flight, the instant, randomly generated missions are set in a choice of either Pearl Harbor, Midway, Columbia, the Gulf of Mexico, the Bering Sea, the Aleutians, Crete, or Urborg. In the main game, players choose between modem, serial, or network play. Firing up the single player mode, I expected to move to Miramar. Instead, the plot departs from the film and immediately moves to a crisis situation off the Cuban coast. The mission briefings and debriefings are in full motion video using live actors.

In flight graphics feature the most impressive external SVGA views of aircraft to date. The F-14 in particular is beautifully ren-

better Spectrum Holobyte in effectively capturing the total combat flight simulation experience. Now, the company is finally prepared to introduce an exciting new flight simulator. One not based on a meticulous flight model or deep campaign, but on the most popular military flying movie of recent history — *Top Gun*.

The preview version arrived on one CD. Installation required a minimum 21MB or an optimum 37MB hard drive space. Other minimal hardware requirements are a 386 with a math coprocessor, double speed CD-ROM, and 8 MB of RAM. The beta supported only a joystick with no indication of rudder pedal or analog throttle support. Sound cards are lim-

ing the recent trend to not support General MIDI or the Roland MT-32.

The introduction sets the theme using the expected video footage and digital soundtrack from the film. You take on the role of Maverick — as becomes quite clear when James Tolken gets in your face and announces that you and Merlin

Close up HUD view: In trail formation behind Raven soon after the catapult launch. This HUD is more detailed than the real F-14's.

As you circle the carrier, a video window pops up showing a Mig launch an Alamo. The analog cockpit gauges are comprehensive.

The radar shows multiple bogies, and your Phoenix missile gets a close miss on a Mig as he breaks hard away.

dered. This art comes at a cost. High resolution brings a 486/100 to its knees at about 3-4 frames per second. Low resolution graphics are smooth and on par with the older generation flight simulations. Ships are wonderfully detailed, also — their sterns even rise and fall as they travel through the sea. The sea graphics, however, are a bit garish at low altitude, and the beta had no way to disable them. Sky texture is quite nice and clouds are very accurately portrayed. Ground objects are abstract and realistic when viewed from high altitude.

The flight model, while obviously simplified, is comparable to products such as *U.S. Navy Fighters*. The model possesses good flying qualities, featuring energy bleed and inertia. The *Top Gun* F-14 is designed to turn and burn, as a continuous horizontal turn at military power with full aft stick never sees speed drop below 200 knots indicated. Accelerated stalls and buffeting are not present, and I could not induce a spin in the aircraft.

The most simplified portion of the simulation is the avionics. The radar is a pop-up window with a "God's eye" view of 360 degrees and up to 80 miles. IFF and target selection are automatic. Another pop up window appears on the right with video clips of significant activities, and video clips of your

RIO and wingmen appear in the center. The forward views include a close up HUD view and a full cockpit view with analog instrumentation. The padlock view is effective at close range and simply uses the virtual cockpit mode to track a selected target.

Although missions featured up to four talkative wingmen, the beta had no wingman commands or communications abilities. This early version was too unstable to allow a fair assessment of the AI or mission set, but the first few BARCAP and bomber escort missions were quite challenging.

Top Gun has long been announced as an uncomplicated flight simulator striving to immerse a player in the movie setting. Reviving the Top Gun movie and combining it with a Spectrum Holobyte simulation seems like a recipe for success. Given the entertaining mission set, reasonably believable flight model, and cut scenes faithful to the movie environment, *Top Gun* will certainly be on target.

After a patrol, you and Merlin relax by turning and burning over the Cuban countryside.

Su-27 Tips, Part 1
Basic Flight Training

by Tom "KC" Basham

Although the world may not neccesarily be more stable now that the Berlin Wall is down and the Cold War is over, many new opportunities exist today that were unthinkable during the last four decades. You've probably spent a fair amount of time driving F-14s, F-16s, F-15s, and F/A-18s around. You've probably shot down more than a few MiG-29s and Su-27s. Now, however, you have the opportunity to see "how the other side lives." Although other simulations have let you test fly Russian hardware, SSI's *Su-27* is the first hardcore simulation that not

The inverted spin

only puts you in a Russian cockpit, but accurately represents Russian cockpit operations. You've spent hundreds of hours learning standard "Western" avionics and symbology, only to find Russian avionics bear little resemblence to their NATO counterparts. It's time to learn how to fly again. This article launches a series teaching *Su-27* flight, combat, and integrated battlefield techniques. In this first installment, we examine basic flight techniques.

View Dilema

The first time you strap into your simulated Su-27, you'll notice your view controls are somewhat restricted. You can pan your view around the cockpit, but you can't look back over either shoulder or check your six o'clock position. Further, the padlock view loses lock if the target passes behind your 3-9 line (the line drawn from your 3 o'clock position to your 9 o'clock position). These restrictions were not design oversights nor bugs. The pilot sits low in the cockpit (compared to Western designs) where the canopy rails and the ejection seat restrict rearward views. Western pilots who have sat in the Su-27 (or the very similar MiG-29) have heavily criticized its lack of rearward visiblity. Practice dogfights against German MiG-29s inherited from East Germany reveal the severity of the view restrictions.

The Soviet battle doctrine which shaped the Su-27 planned to send massive waves of missile-equipped fighters to the op zone, launch a wall of missiles, then turn back. Close combat dogfighting was not a big part of the program. As such, some items deemed critical in the West (such as reward visibility) was not a high priority in the East. The Su-27 can be a very capable fighter when handled appropriately, but you will always have to contend with the restricted rear view.

The Basham Approximation

Next, you'll notice the cockpit instrumentation and HUD differ from familiar western designs, especially the flight path ladder on the HUD. First, altitude is displayed in meters and airspeed is given in km/hour. Over the long term, you should learn the Su-27s flight model in terms of metric units. You'll fly the plane better when you learn to recognize that 280 km/hr is too slow for a dogfight. In the meantime, however, you need to quickly convert the metric measures to standard units. Calculating altitude is easy: simply multiply the altitude in meters by 3 and you've got a decent approximation of your current altitude. For airspeed, I usually just divide the indicated speed (in km/hr) by two. Mathematically speaking, this calculation is blasphemously innaccurate. From an engineering standpoint, however, this "Basham approximation" calculation is fast and "close enough for government work."

For example, using this algorithm a displayed speed of 650 km/hr would produce a result of 325. In reality, 650km/hr translates to approximately 370 knots. My "back of the envelope" calculation isn't accurate, but it does indicate I'm well within normal dogfighting speeds. A displayed speed of 300 would generate a "Basham approximation" of 150kts. My speed is actually around 170kts. In combat at these speeds, those 20kts are irrelevant. Either 150kts or 170kts is much too slow for combat maneuvering. Ultimately, to maximize combat performance you need to learn the Su-27's envelope in metric units, but in the meantime these approximations will keep you in the fight.

Next, notice the difference in attitude indicators. Where Western HUD designs show the horizon, or "water line," Russian

The upright spin

HUDs *show wing bank*. The line on the HUD rotates with your wings, exactly backwards from typical Western systems. The Attitude Indicator (ADI) instrument on the panel, however, bears little resemblence to the ADIs found in Western Aircraft. Under most circumstances, the rolling ball gives bank and roll information, again showing the position of your wings instead of the horizon. The vertical line in the center of the ADI is a "required bank indicator." When using various navigation (NAV) HUD modes, this needle deflects to the left or right indicating how much you need to *bank your wings* to fly to the next waypoint. Likewise, the "altitude scale" needle on the left side of the ADI indicates whether you need to climb or dive. Normal during waypoint navigation, keep the bank and climb indicators centered.

Knife Fighting

The Su-27 can be a bit tricky to fly. You can wind up in a fairly nasty, altitude-consuming spin with little warning. Some spins can easily devour 3,000 meters of altitude before recovering. When you take the Su-27 into a dogfight, keep your energy level high and keep an eye on your angle-of-attack (AOA) meter. You'll notice the Su-27 buffets slightly when the AOA needle reaches the red zone. Avoid generating significant yaw at with this much AOA. Lots of rudder at high AOA, regardless of speed, can result in an unnanounced departure and a nasty spin. If your Su-27 begins to buffet, especially at low speed, neutralize the rudder immediately, increase throttle (if possible), and get the nose down to increase speed.

If you do depart the Su-27, you must immediately establish the direction the aircraft is rotating. *Trust your instruments*. You have two different turn-and-slip indicators on your dash, one below the ADI and a smaller one on the Variometer. First, reduce power to minimum, then simply watch the small ball drift to one side or the other, then apply *opposite* rudder. If the ball drifts left, apply right rudder. Center the joystick and press forward

slightly. When the aircraft recovers from the spin, the nose will try to drift upwards, possibly causing a new departure. When the rotation stops, gently increase power while applying sufficient stick pressure to keep the nose down until speed reaches 340 km/hr. Once your speed has increased, gently pull out of the dive.

This concludes the first lesson. Try creating an "empty" mission with no enemies of any kind and practice a few spin recoveries. Climb up to 10,000 meters. Then, execute a climbing turn, with the nose pitched up at least 50 or more degrees. Reduce throttle. When the aircraft begins to buffet press and hold one rudder pedal. Hold the control inputs until a spin develops, then execute the recovery procedures previously outlined. Watch the airspeed and AOA indicators during all of this, noting the speed and AOA of each departure. Your aircraft obtains maximum turn performance just at the very edge

The tail slide

before it stalls; the closer you can fly your aircraft to the edge the better you will perform in combat. Next time, we'll examine the Su-27's avionics suite and how to use it in combat.

★ ACADEMY ★
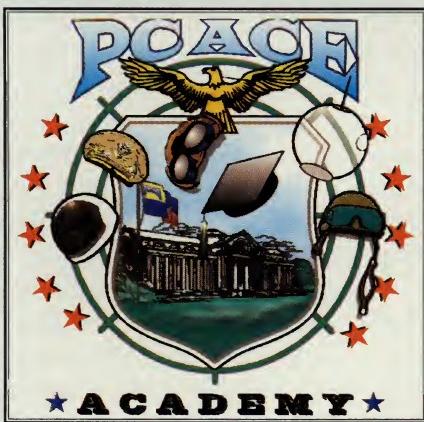
Fighter Pilot
Communication Procedures

by Bryan "Cujo" Edmonds

One of the most common problems faced by today's modern fighter pilots is talking to one another and their controllers about their tactical situation. In fact, tactical com-

Maneuvering (BFM) once engaged, but the capacity to talk during the fight is fleeting and requires constant attention. Usually, the comm is pretty good while

where they are, what they are doing, and where they are going. The radio congestion can take an already confusing situation and turn it into a "gordian knot". Simulator

Proper communication is the key to overcoming "fog of war<

All Photos: Arms Communication

muncation is one of the defined objectives in every air-to-air flight briefing. A very typical set of mission objectives would be "(1) Detect/ Sort/ Target all factor groups (2) Engage/ Kill on our terms (3) Comm in accordance with 3-1". Of the three, the comm drill is probably the hardest. After a few years of flying fighters, almost everyone can run their radar and fly Basic Fighter

you are marching toward your desired engagement zone (DEZ), but typically breaks down as the fight develops. Suppose you have one fight in the east (a 2-versus-1), but you are notching in the west from a radar missile shot while your wingman is engaging the bandit who shot at you somewhere above and to your left. Everyone ends up using their radios simultaneously, describing

pilots flying networked or online simulations usually encounter the same comms problems. Cleave this knot apart with the razor sharp use of 3-1 terminology.

You may ask, "Hey Cujo, what is 3-1?" It is the Multi-Command Manual the U.S. Air Force uses to describe our tactics, both air-to-air and air-to-ground, in one single source document. You can find some dated material

drawn from this document in most of the modern-combat flight sim manuals. *Falcon 3.0's* manual is a great starting point for a lot of the brevity terms, but it doesn't really tell you how to use them. Good comms require more than simply saying the right code words, those words must be used in the appropriate message format. The basic format is "Call Sign, Directive, Descriptive" and it will be the brunt of this discussion on basic communication theory. In other words, announce *who you're talking to, what you want them to do,* then follow up with *why you want them to do that.*

There are basically two types of radio transmissions, *directive* and *informative.* Most calls in an air-to-air fight are "informative," where we discuss what is going on around us. When the flight is threatened the most important calls are made, the "directive" calls. *Viper One, break right! Bandit high six!* This is the classic example of the "callsign, directive, descriptive" format. It says who you're talking to, what to do, and why. We have all heard the "break" call but there are plenty of other "directive" examples. Usually directive calls (aside from break calls) are made by the element leaders in a four-ship formation. Almost always a directive call comes from the flight lead. When a wingman is given a tactical lead to engage a bandit, the leader still has "the hammer" to call him off. This "hammer" concept is what we in the business call "flight discipline," and it is the most important factor in effective fighter employment.

For example, Viper flight has engaged a bandit. The leader, Viper One, is chasing the bandit in a right hand turn when he finds his wingman, Viper Two, pursuing the same bandit. Viper One wants Viper Two out of the way before he takes a shot, so he might call:

Radio channels must be kept clear so emergency calls from AWACS can be heard

"Viper Two, come off left, Viper One engaged high right five." Viper Two would understand that Viper One is at his high 5 o'clock position and needs him to clear out of the way to the left.

This leads into the larger area of air-to-air communication, the informative call. Going back to the "break" call, as soon as the call is made, Viper Two must ensure that Viper One is properly defending himself and add any amplifying informative calls as necessary: *Viper One, continue hard right, bandit your deep six, stuck in lag.* This is the
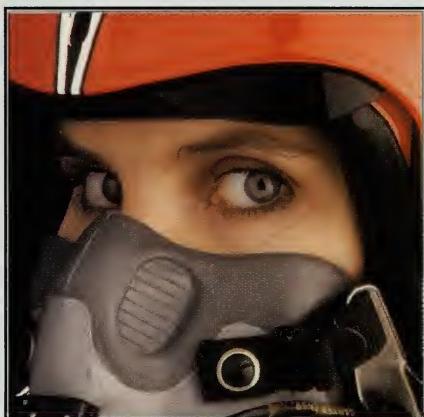
information Viper One needs to gain a tally ho and properly defend himself. Viper Two must make these information calls until Viper One has the tally or until the bandit is a fireball from Viper Two's weapons. *Viper Two, engaged offensive, shot in ten* is another example of an informative call. This might give Viper One the warm fuzzy that Two is 10 seconds from killing the wily bandit. This stage of the battle is where we pay most of our attention, and where comm usually breaks down. The following is a typical radio exchange in the heat of battle:

Wingman: "Lead, Lead... I'm above the fight at 20 thousand and ... I can get a shot"

Lead: "Roger that, I see you up there and I'm stuck in lag.... I'll turn left and you come in and kill this jerk."

This exchange can be summed up with:

Wingman: "Viper One, Viper Two, entry high six"

Lead: "Viper Two, Press, Viper One off left."

The informative radio calls must be as brief as possible so that other calls are not stepped on, such as warning from an AWACS or other ally. Here on paper it is difficult to really convey the actual vocal delivery method. When you make a radio call in the heat of battle your voice sometimes changes from its natural state, and you can't always recognize your wingman's voice. It is, therefore, imperative that you include the "Callsign" portion of any radio call, avoiding the "Hey you this is me!" factor. Using full callsigns allows other fighters in the area to selectively "tune out" radio calls that are not for them. It may seem minor, but when 16 different flights of four are all on the same AWACS frequency it makes a difference!

It is a matter of flight discipline to always force yourself to talk in 3-1 terms as much as possible. If you want to talk like a fighter pilot while turnin' and burnin' in the next generation of cooperative fighter simulators you need to start practicing comms during your head-to-head *Falcon 3.0* fights. Dig out those sim manuals and look up the terms in the back. Come up with a "standard" that you and your squadron agree on and stick to it. If fighter pilots and sim pilots can keep their "3-1 comm standard" mission objective, then the rest of the fighting is mostly a piece of cake.

Air Combat Energy Management Part 1:
What Exactly is "Energy"?

by Tom "KC" Basham

I've lost count of the number of movies involving aerial combat where the hero winds up with a bad guy lining up from behind, preparing to send the hero into oblivion. Suddenly, in a stroke of genius, the hero exclaims some variation of, "I'll pop the


G loading for a constant AOA as airspeed increases.

G load

Structural Limit - G loads cannot increase any further regardless of speed.

G load increases as speed increases.

Airspeed

G-load increases with airspeed until either maximum AOA or the airframe's structural limit is reached

brakes and he'll fly right by." The hero extends the speed brakes, reduces speed drastically, and watches the totally dumbfounded bad guy fly past and into the hero's guns. That may be fine for Hollywood, but it doesn't quite work that way in the real world—or in realistic combat simulations. More likely, our hero would have found himself hanging helplessly near stall after bleeding away all of his speed while the bad guy restrained an amused chuckle and opened fire. *PC ACE Academy* is designed to dispel such Hollywood myths. As an ongoing fea-

ture, *PC ACE Academy* examines real-world military tactics and how to effectively employ them in entertainment simulations.

We begin the series by examining the basics of Air Combat Maneuvering, or ACM. Before debating the relative merits and applications of maneuvers like barrel rolls, yo-yos, etc., simulation pilots must first understand the underlying principle behind all such maneuvers: *energy management.* Energy Management basically means *utilizing the laws of physics governing flight to achieve maximum performance from an aircraft.*

KINETIC AND POTENTIAL ENERGY

Recall that there are two types of energy, *kinetic* energy and *potential* energy. In terms of air combat, kinetic energy

equates to speed. The faster the aircraft is moving, the more kinetic energy it possesses. For all practical purposes, combat pilots treat kinetic energy like money. As we will see below, maneuvering an aircraft expends kinetic energy. In simplest terms, combat pilots try to stockpile kinetic energy then "spend" it during combat to "buy" maneuvers.

In terms of air combat, potential energy equates to altitude. Where kinetic energy operates as "cash" to buy maneuvers, potential energy acts like "credit." Kinetic and potential energies are interchangeable. A climbing aircraft slows down (thus reducing kinetic energy) but increases altitude (thus increasing potential energy). A diving aircraft accelerates (thus increasing kinetic energy) while losing altitude (thus reducing potential energy). A slow moving aircraft at high altitude possesses a "line of maneuvering credit" based on its altitude. By diving, and thus cashing in the potential energy "credit" for kinetic energy "cash," the aircraft obtains maneuvering energy.

Total energy status indicates the combination of an aircraft's kinetic energy (speed) and potential energy (altitude) at any given time. Using energy management techniques, the pilot attempts to maintain the highest total energy status at all times by utilizing the laws of physics and exchanging speed and altitude. If the aircraft needs to slow down, it should climb as much as possible and store that speed as altitude. When an aircraft has speed it can maneuver. When an aircraft has altitude it can exchange altitude for speed and subsequently maneuver. When an aircraft has neither speed nor altitude then that aircraft is in a world of hurt.

HOW THE AIRCRAFT SPENDS ENERGY

By now you're probably asking, "So how exactly does the aircraft 'spend' energy?" It all boils down to two factors used to measure an aircraft's maneuverability: *turn rate* and *turn radius*. The turn rate indicates how many degrees an aircraft can turn per a given unit of time, such as "10 degrees per second." Turn radius indicates how large the radius of the circle the aircraft is circumscribing will be, such as "5,000 feet." Ideally, a fighter aircraft should possess a high turn rate with a low turn radius. Unfortunately, there are problems achieving that goal.

If you've read the manual for almost any flight simulator available, you've probably read about the "four forces" of flight. Briefly, *weight* is the weight of the aircraft due to gravity. *Lift* is the force generated by the wings which offsets weight and is measured as "g forces." *Thrust* is the propulsion generated by the engines which creates speed. *Drag* is the amount of resistance the aircraft feels while moving forward, which decreases speed. Understanding the relationship between these forces is critical to successful air combat.

In basic terms, turn rate is dependent upon lift and airspeed as shown by the equation:

$$\text{Turn Rate} = \frac{\text{G LOAD}}{\text{SPEED}}$$

The actual equation is more complex, but this reduction illustrates the necessary point: increasing the g load increases the turn rate while increasing speed reduces the turn rate. Meanwhile, turn radius is defined by:

$$\text{Turn Radius} = \frac{\text{SPEED}^2}{\text{G LOAD}}$$

Again, the actual equation is more complex, but this reduction shows that turn radius increases rapidly as speed increases since the speed is squared, but increasing g load reduces the turn radius. Both of these equations show that *high g loads at low speed offer the best turn rate and turn radius.* Unfortunately, there's a problem achieving that. To understand this problem, we must examine where g loads come from.

We measure the lift the wings produce in terms of Earth's gravity, or g loads. A lift of 2g, therefore, is a force twice the strength of Earth's gravity. In this context, "lift" and "g
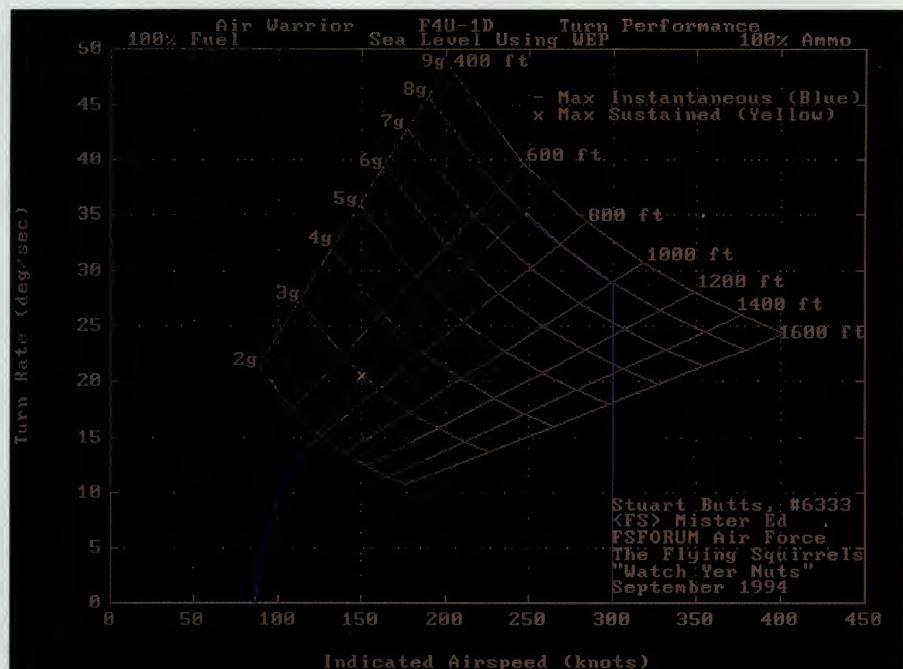
This E-M diagram indicates an F4U Corsair's corner speed at sea level is approximately 245kts at 8g which results in a 700 ft radius with a 35 deg/sec turn rate.
(Graph courtesy Stuart Butts)

load" are synonymous. Again, if we reduce the equation for lift to simple terms, we have:

Lift = Air Density x Wing Area x Speed x AOA

Lift is based on several items, such as the current speed, the size and shape of the wing, and the angle of attack (AOA). AOA is the angle at which the wing meets the airflow. Increasing AOA increases the amount of lift (and drag) the wings generate up to a point. When AOA increases too far airflow over the wing is disrupted and the wing *stalls*. Stalling an aircraft has nothing to do with speed, attitude, or g load. A stall occurs when the wing exceeds critical AOA.

Every wing developed to this point in time has a "critical" or "stall" AOA. Upon reaching stall AOA lift dissipates. The wing generates the maximum lift possible just a fraction before reaching stall AOA. The actual amount of lift the wing generates at this point is primarily dependent upon the speed and altitude of the aircraft. For example, an aircraft at 10 degree AOA would generate more lift at 300kts than at 100kts. As shown in the first figure, every aircraft has a maximum g load. Exceeding that g load damages or possibly even destroys the aircraft. Typical values for fighter aircraft range from 6g to 9g. A pilot must observe this *structural limit* regardless of

available airspeed and AOA or he may find himself walking home.

Incidentally, a pilot can stall the aircraft by exceeding stall AOA regardless of the aircraft's speed. The amount of AOA required to stall does not change regardless of airspeed; however, the amount of g forces the pilot feels when he reaches stall AOA varies significantly with airspeed. The faster the aircraft is moving when it reaches stall AOA, the more g forces the pilot feels.

INSTANTANEOUS VERSUS SUSTAINED PERFORMANCE

So, at any given time we can look at an aircraft's speed and AOA and determine the amount of g forces being generated. Using the g load and speed we can further determine the aircraft's current turn rate and turn radius. According to the equations, the pilot should keep speed low and g load high. Now the problems appear. In simple terms, *pulling g uses up energy.*

First, the relationship between lift and drag comes back into play. Keeping g high means generating lots of lift. Unfortunately, generating lift also generates drag. Drag slows the aircraft down, thus in turn reducing the amount of lift available. Pilots call this vicious cycle *bleeding speed.* In a high-g turn, every aircraft will bleed speed

and slow down. When speed drops available g drops and turn performance suffers. The laws of physics prevent the aircraft from maintaining high g load at low speed.

Therefore, we have two types of turn performance: *instantaneous* and *sustained*. Instantaneous turn performance is a transi-

CORNER SPEED

Second, lift is a "bounded" quantity compared to speed; speed can increase much more than lift because of the aircraft's structural limit. Above that structural limit lift remains constant at the maximum value while speed is (in this context) unbounded. Referring back to
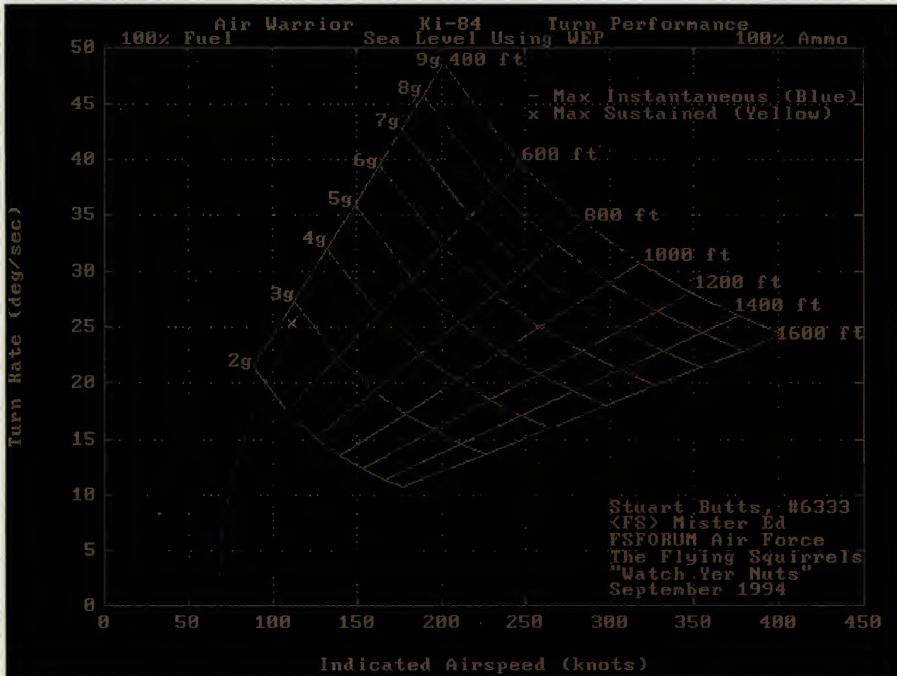
This E-M diagram indicates a Ki-84's corner speed at sea level is approximately 180kts at 7g, resulting in a 400 ft turn radius with a 43 deg/sec turn rate, significantly tighter than that of the F4U.

tory value. It describes how much lift the aircraft can generate immediately after beginning a turn. Since speed begins to decay immediately the amount of lift being generated also drops quickly. Instantaneous turn performance is the best performance the aircraft can manage for a fraction of a second before drag begins eroding speed away. Sustained turn performance is a "steady state" value. Remember, while drag is trying to reduce airspeed, the engine's thrust is trying to maintain airspeed. Speed drops so available g load also drops. Since g load drops the amount of generated drag also drops. Eventually, thrust and drag reach equilibrium. An F-16 at 500kts, for example, can generate an instantaneous 9g load. Within seconds, however, the increased drag generated by the 9g decays speed down to around 350kts. At this speed, the F-16 can generate only about 4g but the engines thrust maintain equilibrium with the drag generated. Sub-sequently, the F-16 can sustain 4g at 350kts.

the turn rate and turn radius equations, we see that if we keep g load constant but increase speed, then turn performance begins to suffer quickly. That's where the concept of *corner speed* comes in. Corner speed is the *minimum* velocity required to produce the *maximum g limit* at maximum AOA. Plugging "minimum" speed and "maximum g" into the turn rate and turn radius equations returns the highest possible turn rate at the minimum possible turn radius. Above corner speed, the aircraft's velocity is "too high" for the amount of g forces being generated, causing turn rate to decrease and turn radius to increase.

ENERGY MANAGEMENT: PUTTING IT ALL TOGETHER

Thus, the topic of energy management returns. Please note a very important point: "turn performance at corner speed" and "sustained turn performance" are not necessarily related items. "Corner speed" occurs at maximum possible g load with minimum speed. "Sustained turn performance" occurs at max-

How does it all fit?
by Tom "KC" Basham

Energy management is a long, complex topic. You may be wondering, "just how does any of this apply to flight simulations?" Any combat simulation making reasonable strides to be realistic must operate according to well-defined laws of physics and subsequently abide by the rules of energy management. Simply put: flying a simulation requires the same energy management techniques as flying a real aircraft.

In both simulations and the real-world, pilots must vary their fighting techniques based on the strengths and weaknesses of their aircraft. A pilot cannot fly an F-4 in the same manner as he would fly an F-16. The pilot must understand the underlying rules of energy management and how his aircraft performs before he can effectively employ is aircraft in combat.

Whether you're flying an Su-27 or an F-16, the laws of physics are the same. Both aircraft follow the same turn rate and turn radius equations, but the variables entered into the equations vary. Effectively, the pilot must first learn how the equations work, then learn the variables specific to his aircraft.

imum sustainable g load and airspeed. Corner speed provides the best performance but cannot be sustained for any length of time in most aircraft unless the pilot practices good energy management.

How does all of this relate to energy management? Obviously, no combat pilot whips out a slide rule during a dogfight and begins solving formulas. Understanding the relationship, however, between AOA, lift, and turn performance is critical to the combat pilot. We've now defined what "energy" is as well as its importance to air combat. We understand that, in terms of turn performance, maintaining "corner speed" is the ultimate goal. There are still many unanswered questions, though. What happens when you can't reach corner speed? How do you "save up" energy so that corner speed is available when you need it? Sometimes the enemy can still out-turn your aircraft even when you're at corner speed. What do you do then? *PC ACE Academy* will examine these questions and more next time, in the second half of our discussion of energy management.

Killing Aliens:
From Space Invaders to Dark Forces
A Short History of Science Fiction in Computer Games

by Laurie Yates

The seminal moment in the transformation of the sci-fi computer game from target practice to actual science fictional content did not occur on a computer monitor. It happened on 70mm screens (in Dolby sound) with the arrival of George Lucas' seminal film, *Star Wars* in 1977. It may not even be overstatement to attribute the original appeal of personal computers to the simultaneous mass market mania inspired by Lucas' cinematic milestone.

Suddenly, computers became icons of power. Their very use was science fictional, something fans of the genre had been reading about for years. Computers, and their early analogs (everything from brains in a bell jar to the numberless control panels on countless spaceships), were an integral component of science fiction long before people ever dreamed of having their own PC. Science fictionÕs writers had speculated for decades on the nature of synthetic intelligence and its by-products, from Asimov's ethically-driven robot novels to Phillip K. Dick's psychiatrist-in-a-suitcase.

So the mix of sf and computers was inevitable. In fact, the first computer game (certainly the first with graphics) is generally regarded to be Steve Russell's *Spacewar*, which was created on an MIT mainframe back when dinosaurs ruled the Earth (i.e., 1962). Unfortunately, when Nolan Bushnell attempted to recreate this game as a coin-op arcade machine, it proved too sophisticated, confusing, and generally intimidating to the pinball-oriented market.

It also proved too tame. The only other successful sf-based entertainment from that period which was cerebral rather than shooter-driven was *Lunar Lander*, in which players had to deal with the conservation and expenditure of energy in order to land a small space craft on a pre-designated spot.

What the market *did* enjoy, however, were computerized entertainments with sf settings in which aggression was the game's primary focus.

A year after *Star Wars'* release, a small time pachinko manufacturer in Japan developed a little coin-op number called *Space Invaders*. Midway picked up the U.S. arcade license, while Atari snatched the American video game and computer rights (Atari was already planning to release a home computer at this point, plus there was some question as to whether computer rights needed to be purchased seperately). The game was a sensation, earning money on a level never before seen in the electronic entertainment industry. The signature thump-thump-thump sound effects of *Space Invaders* became as well-known as the danger theme from *Jaws*. As science fiction, however, *Space Invaders* was considerably less sophisticated than *Plan 9 from Outer Space*. The player moved a horizontally mobile cannon across the the bottom of the screen while legions of minimally animated alien invaders marched downscreen in endless columns.

Because of the industry's immaturity at this pointÑas well as the total surprise with which *Space Invaders* seized the marketÑlegitimate licensees were unable to put the skids on yet another invasion: the parade of *SI* wannabes, with like sounding names and disturbingly similar sound and graphics. The nascent computer market was soon flooded with *SI* clones. There hardly seemed to exist a home PC—whether it was an AppleII+, A TI-99, a TRS-80, or a $99 Sinclair—that didn't boast at least one invasion game within its

first and third-party entertainment library. (Needless to say, this level of idea piracy did not continue; when Atari acquired the home rights to Pac-Man, several years later, Warner's lawyers hunted down maze chase clones like dogs and quickly put them to sleep.)

The early years of computer sf games were not exactly inspiring. Somewhere around ninety percent of all games were lame imitations of coin-op and video game hits. Arcade titles such as *Galaxian*, *Asteroids*, and *Defender* were relentlessly ripped-off by the cottage industry-level, third party computer software developers. Most games were created entirely by one person—from design and graphics right down to the music and sound effects—as opposed to the teams which labored on the coin-op originals. Moreover, early computers were not well-suited to action games. The Apple didn't even have sprite generation capability, making the programming a nightmare challenge that only a handful of specialists tackled with any success

The breakthrough game was, without question, Atari's brilliant *Star Raiders*, a cartridge format game for the Atari 400 and 800 computers, which combined action and strategy, placing the gamer inside the spacecraft's cockpit, with access to targeting and grid mapping. In short, it fulfilled the fantasy that *Star Wars* had created a few years earlier. Moreover, the first-person perspective enhanced the game's role-playing component, and many early gamers played it "*Star Trek*-style", with one player giving the orders, one manning the keyboard ("Damn it, Jim, I'm a doctor, not a typist!"), and a third controlling the joystick.

Unfortunately, despite the success of *Star Raiders*, the early years of computer sf gaming were dominated by coin-op translations and outright rip-offs, with the focus fixed firmly on blowing things up. *Asteroids* (Atari) put the gamer in control of a small spacecraft piloted via thrust propulsion and armed with a single cannon, lost in the midst of an asteroid field. If any of the floating space rocks made contact with te ship, a "life" was used up. The asteroids, in turn, started out uniformly large, but when hit, they split into two smaller asteroids. These, in turn, split into two even smaller rocks, all of which the player had to eliminate. *Missile Command* (Atari) gave the player control over six ground-to-air missile launchers and

A great license but the games can't be syndicated.

assigned them the task of defending a city located at the bottom of the screen. *Bezerk* sent players through a series of rooms, taking out alien-made robots on the run, while *Defender* (Williams) introduced the side-scrolling space shooter format, and games like *Galaxian* and *Gorf* (Midway), *Astro-Blaster* (Sega-Gremlin) and *Phoenix* (Centauri) were happy to one-up *Space*
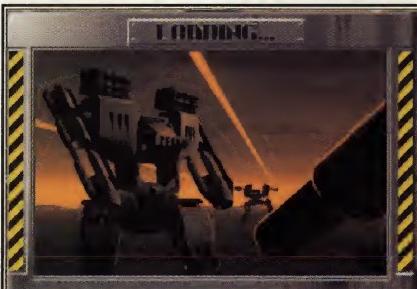
Earthseige: The Mechwarrior concept morphed once again.

Invaders with additional screens, flying aliens, and other bells and whistles fused onto the original formula.

These were all wonderful entertainments in the arcades, but their computer doppelgangers oftened lacked the pizazz of their inspiration. Titles like *Super Invasion* (Creative Computing/Apple II+), *Invaders from Space* (Acorn/TRS-80), *Alien Typhoon* (Broderbund/Apple II+), and *Apple-oids* (California Pacific/Apple II+) clogged software shelves with mediocre game play and generic visuals.

The only alternative to these arcade wannabes in the early 80s were text adventures, action adventures, and action-strategy games. Automated Simulations had a critical

and popular success on both the Atari and Apple computers with the classic *Star Warrior*, a vertically scrolling action-strategy game in which the player's physical status, shields, heading, energy level, etc. occupied the right side of the screen with the rest of the playfield devoted to simple arcade-style graphics displaying the path of the player-character. Strategic Simulations (nee' SSI), meanwhile, offered gamers the Trek-like *Warp Factor*, a fleet-level tactical contest.

Text adventures with a sci-fi theme were also occassionally available to discerning gamers. Memorable early offerings included *Oo-Topos* and *Cyborg*, both from Sentient, and designed by *Bubsy Bobcat* creator Michael Berlyn. And who could forget *Softporn Adventure* from On-Line Systems (later Sierra On-Line), a text adventure set on a futuristic Vegas-style pleasure planet?

Thus the pattern was set over the next few years. The majority of sf computer games were arcade clones such as *Asteroid Field* (Cavalier/Apple II+) and *Bandits* (Sirius/Apple II), a nicely animated invasion game, while a few companies like SSI carved up the smaller strategy and adventure sf markets, and text adventures began to fade from the gaming scene altogether. SSI's *Cosmic Balance* and *Cosmic Balance II* represented state-of-the-art space combat in a strategy game format. Automated Simulations, meanwhile, changed its name to Epyx and delivered games like *Dragonriders of Pern* for the Atari and Commodore64 computers. Based on the work of noted sf and fantasy author Anne McCaffrey, the game mixed action and

strategy, with the complex political maneuvering padded by largely lame arcade-style sequences. Epyx also continued to produce excellent action-strategy games such as *Silicon Warrior*, a sci-fi color-changing game with tremendous play value. Finally, new publishers like Electronic Arts entered the sf software arena. EA's first sci-fi claim to fame came with the arrival of the classic multi-player game, *M.U.L.E.*, in which four players compete on a lifeless planetoid to build the strongest colony.

Infocom, meanwhile, remained one of

the few publishers who still found text adventures profitable, and *Planetfall* (Infocom/Atari and Apple computers) is probably the best example of the genre. The player is cast here as a Space Cadet, marooned on a doomed planet with his robotic companion, Floyd. The gamer had to solve puzzles and guess the predicate in this save-the-planet adventure.

Other entries from the mid-80s included such planetary conquest games as *Titan Empire* (Muse/Apple II+), and *Conquering Worlds* (Datamost/Apple II+). Several games from that period dealt with the idea of time travel, including *Time Zone* (Sierra On-Line/Atari and Apple), *Adventures in Time* (Phoenix/Apple II+), and *Dino Eggs* (Micro Fun/Apple, Atari, C64, and IBM).

It seems ironically appropriate that the next major step forward in terms of sci-fi games came directly from LucasFilm, the folks who got this article started. George

Lucas was quick to see the obvious synergy between games and movies, especially in the sf genre, and he put together an impressive development team that included Stephen Arnold, Peter Langston, and David Fox. The company immediately set to work on two major projects, aiming initially at the game-friendly Atari computer systems.

The first was *Rescue on Fractalus*, the most significant addition to the sf game genre since *Star Raiders*. A gentleman named Benoit Mandelbrot at IBM had already developed the concept of fractile geometry, and LucasFilm's Loren Carpenter developed an on-the-fly method of using fractiles to generate ongoing landscape in the short film, *Vol Libre*. The next challenge: bring the technology to real-time flight within the boundaries of existing computer systems.

His success speaks for itself; the game remains a masterpiece, and contains the first genuinely frightening moment in electronic gaming history. Players pilot an atmospheric fighter craft over the surface of a mountainous planet bristling with enemy aliens (called "Jaggi") in order to take out the hidden ack-ack installations while rescuing downed human fighter pilots. To execute a rescue, the ship had to find a landing site and set down long enough for the pilot to make it inside the ship. Occassionally, however, an alien infiltrated the ship, disguised as a human pilot. It is only after the creature has been allowed onboard that the player realizes their error, in a heart-stopping scene, in which the alien suddenly rears up, in all its glorious ugliness, and smashes the cockpit windshield before ending the mission on a most discordant note.

The second game was *Ballblazer*, a futuristic sport in which players drive a "roto-foil", a small, multi-directional vehicle which moves around the field in an attempt to capture a round, floating ball and blast it into the constantly-moving net. The game was tremendous fun, and the high class production values (including the construction of both full-scale and model rotofoils) made it an overnight sensation.

Unfortunately, the sensation occured before the games were even released. By the summer of '84, the Atari computers had reached the apex of their popularity, with user groups springing up everywhere. Most of these user groups, however, were actually

piracy clubs, with gamers freely trading ripped-off software with one another. And, somehow, copies of both *Fractalus* (under the working title, *Behind Jaggi Lines*) and *Ballblazer* leaked into the pirate network. Within a month, it seemed like half the Atari computerists in the country had illegal copies of one or both games.

Lucas went ballistic. A man who had kept some of the most anticipated films in history under wraps until it was time to begin the pre-release publicity barrage had been undone by a group of computer geeks. Rumors spread that Lucas was so disgusted he wanted out of the game business. The games themselves languished in limbo until Epyx purchased the home rights and released both in '85 on the C64.

While Lucas obviously didn't make good on his threat to take his Ballblazer and go home, a pall was definitely cast over the sci-fi computer genre. Certainly, there was no

rush on the part of other film makers—or existing software publishers—to produce big budget science fiction games, even as video game systems were dying and computer games were entering their first golden age.

In an attempt to distinguish computer games from the rapidly fading home video game market, publishers in the '85-'86 period made conscious efforts to eliminate arcade elements from releases. Reality was in vogue, as *Flight Simulator 2.0* shredded sales records and convinced the industry that gamers wanted serious stuff, not frivolity. Games such as *Space Shuttle* (Activision/Atari 400-800) by Steve Kitchen reproduced a shuttle flight, from launch to landing, with an almost joyless dedication to detail.

By the end of the decade, however, computer gaming had rediscovered its sense of fun. This revelation was aided by the collapse of the 8-bit computer market and the failure of the 16-bit Amiga and ST systems. Suddenly,

the magic word was "Nintendo", and the world was back into video games. Games such as Cinemaware's *Rocket Ranger* (based on the old "Commander Cody" serials and predating Disney's production of *Rocketeer*). Under the direction of Kellyn Beck, this campy tale of nasty Nazis and a strap-on jet pack helped boost Cinemaware into the top echelon of software publishers.

Among the other memorable games from this period are Binary Software's *Starflight* series (Electronic Arts/Mac and PC), Trek-inspired contests that combined strategy with traditional graphic adventure elements; *Earthrise* (Interstel/PC), an animated graphic adventure from Matt Gruson; and Paragon Software's electronic versions of Game Designers' Workshop's *MegaTraveller*.

As we moved into the '90s, science fiction software learned to blend visceral thrills with sophisticated content and cerebral challenge. Perhaps the most significant sf game of the decade has been Chris Roberts' *Wing Commander* (Origin/PC). This wildly cinematic outer space combat game revolutionized the computer sci-fi genre with its ability to exploit state-of-the-art sound and graphics. Each subsequent edition of the game has been more ambitious, culminating in the recently released *Wing Commander III*, a tour de force complete with visually stunning deep space dogfights and animatronic, cat-like aliens.

The other signal sci-fi software of this decade has been based around the two most successful sf sagas in entertainment history: Star Wars and Star Trek. The Star Wars series has been the crown jewel in the LucasArts' software throne. Games like *X-Wing* and *Tie Fighter* are magnificent recreations of film-based scenarios.

Star Trek, meanwhile, has been the subject of electronic games since the mid-80s, when Paramount-owned Simon & Schuster's Electronic Publishing Division released several text adventures based on the voyages of the Starship Enterprise. More recently, however, Interplay picked up the computer rights to the original crew's adventures, while Spectrum HoloByte is summoning all its resources in order to get its long-delayed *Star Trek: The Next Generation* on computer monitors as soon as possible. Simon & Schuster, meanwhile, is back on the Star Trek bandwagon with the *Star Trek Omnipaedia*, a data-
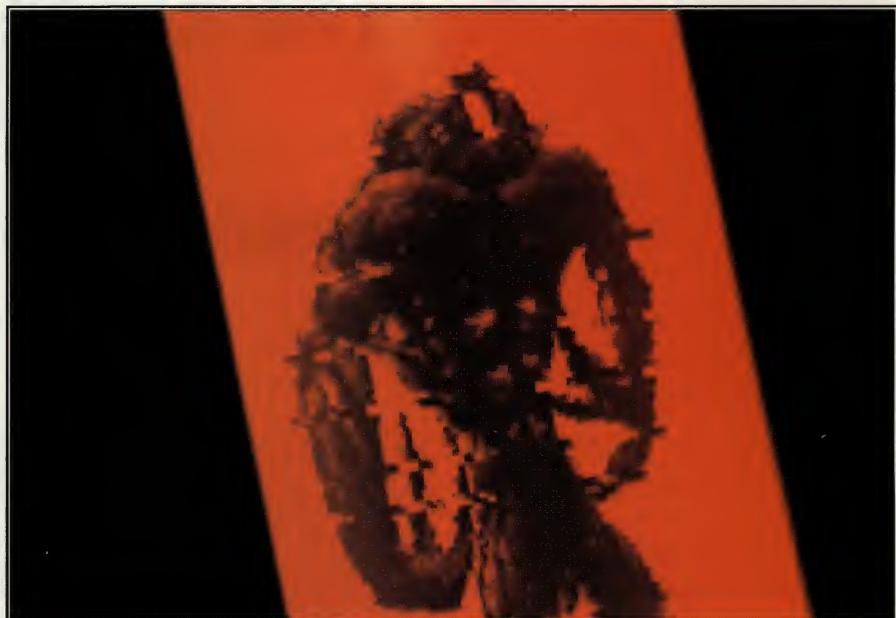
Inferno offered an original look ad feel to the genre space opera.

base of Trek trivia.

As we have seen, the movies create the fantasies, and the games attempt to make them interactive. A film that had a profound effect on the look of many contemporary sf games is Ridley Scott's *Blade Runner*, based on the Phillip K. Dick novel, "Do Androids

A peek into the past with Earthrise.

Dream of Electric Sheep?" Unlike the novel, however, which tells the story of a nearly unoccupied future world, Scott's film is a masterpiece of modern film noir, and it's world of blazing advertisements, gaudy lights, and a crowded, Pacific Rim mentality. Its imagery can be seen in dozens of modern sf games, including Westwood's upcoming computer game version of the film itself.

Much as pop culture influences computer software, the high tech silicon universe of the computer has had a profound influence on popular culture. William Gibson's cyberpunk novels and short stories have had a tremendous impact, in turn, on computer

games. Interplay was the first publisher to develop a game based on a Gibson project. *Neuromancer*, published in the mid-80s, is an impressive early attempt to come to grips with a jacked-in world. Since then, we have seen Gibson's influence in both overt (the game version of the movie version of *Johnny Mnemonic*) and covert (Phillips' *Burn Cycle*) forms.

As we have seen, science fiction and computers are ideal partners; high-powered home computers, after all, *were* science fiction until recently. And now we live in a world which is all but impossible to imagine *without* computers. We've reached the point where a world with no computers, automated teller machines, and cellular telephones would indeed constitute science fiction.

Welcome to the future of sci-fi software. It only gets better from here.

[A brief word to those science fiction purists who may instinctively react to the term "sci-fi" with abhorrence. In our defense, however, we offer the following excuse: 1) This article ran over 2,000 words, in the course of which it gets pretty tedious to write "science fiction" and "sf" again and again; 2) The term was coined by no less a personage than notorious punster and cultural icon Forrest J. Ackerman as a play on "hi-fi"; and 3) The current generation of fans has demonstrated a nostalgic fondness for the term, which they have rechristened: "skiff'-ee". So get over it, already. LY]

The Krasnovians Are Coming!

PC Ace goes on maneuvers with the Elite OPFOR!

by John "General" Perry

The Mojave desert is one of nature's master pieces. The undulating, rugged terrain rolls on forever framed by majestic and equally imposing mountains. Silence prevails, with only the gentle whisper of the hot desert breeze to interrupt the utter tranquillity of the magnificent vistas stretching out before the viewer. Within this heaven sent environment however, lies a piece of hell!

The world renowned US Army's National Training Center (NTC), based at Fort Irwin, California occupies almost 1000 square miles of open desert terrain. Located just south of Death Valley, halfway between Los Angeles and Las Vegas, the NTC was established in 1981 with one simple mission — to provide worthy and realistic opponents for brigade-sized elements from armored and mechanized divisions throughout the continental United States. Throughout the course of a year, NTC conducts 14 training cycles consisting of 20-day rotations. During their rotation, the units, referred to as Blue Force, are subjected to a rigorous training routine the culmination of which is the brigade operation. This is the phase of training PC Ace was invited to attend and, much to our delight, actively participate!

Upon arrival at the OPFOR HQ one is immediately aware that this no ordinary military base. There exists an air of being in the presence of something special. All personnel wear desert camouflage, of a pattern unique to this organisation. Black berets are the order of the day, proudly sporting a red star and brass corps emblem. And the sense of pride and professionalism is visibly noticeable. Although the unit's history is not old and carries no battle honors, it is non-the-less regarded with utmost respect .

The OPFOR order of battle [ORBAT] has been molded to represent a former "Soviet"

Lt Col Baggott , officer commanding the OPFOR, surveys the model battlefield. Together with his leader elements, all options are reviewed and a walk through conducted. Everything should go like clockwork!

style motorized rifle regiment [MRR] with three Battalions trained specifically to portray as accurately as possible the fighting characteristics of such an adversary. Battle procedures, tactics and equipment have all been modified to conform to the mission. In the case of equipment, extensive use of fiberglass visual modification kits [VISMODS] have been employed to replicate the characteristic silhouettes of "Soviet" armor, personnel carriers and even helicopters! The results may appear strange from up close but from a distance there is an eerie feeling as one watches hundreds of "Soviet" armored vehicles on the march — in the Mojave!

The Beast Arises

Fellow PC Ace staff members Jim Bender, Jason Bender and myself arrive at Fort Irwin on a typical Southern California morning. The sun shines brightly and hardly

a breath of air disturbs the harsh, yet tranquil environment which greets us. Within 24 hours this will be torn asunder as the deadly business of modern warfare rolls across the sleepy landscape. For the meantime, however, the world is a safe and peaceful place!

As we drive out into the desert to link up with the OPFOR HQ element, we begin to get a taste of things to come. Individual platoons and companies are lagered along our route, seemingly endless in number, going through the preparations for battle under the watchful eyes of their commanders. A sense of quiet self confidence is evident as this well oiled machine of war prepares for another day of death and destruction. Cresting a small hill, we drive down into a small concealed area where the OPFOR HQ had been established. Camouflage netting conceals the grouped M577 battlefield command vehicles, tactical nerve center for the mission ahead. Greeted

by Capt Leners, we are escorted into a planning group currently underway. Although the OPFOR "owns" the terrain, having the advantage of consistently fighting on familiar ground, the business of planning is taken very seriously and meticulously. The regiment is a formidable organization, comprising many sub-units. It is the employment of all assets , in a cohesive and timely nature which can determine success or failure, even against an opponent unfamiliar with the ground he is about to fight on. With this in mind, it is obvious that nothing is being taken for granted. And while most will acknowledge that it is the rotational units which are there for the training experience, the OPFOR also undergoes constant training. Each preceding battle is analyzed and attention is paid to any lessons learned. For it is only by adjusting to these lessons that the OPFOR is able to maintain its formidable reputation on the battlefield.

Lieutenant Colonel Christopher Baggott, officer commanding the OPFOR, takes charge of the final phase of the Orders Group and immediately makes his presence felt. Unlike the many stereotypes of commanding officers, Lt Col Baggott asks for suggestions, encourages his commanders to rethink alternatives and is not too proud to follow along should a junior officer prove to have a preferable solution to the many problems confronting them. I realize then that I am witnessing a team in action, where the better of the whole supersedes the vanities of the individual. That, I believe, is a significant factor in the continued success of the OPFOR. Later in the afternoon all commanders are summoned again, this time in front of an enormous and very detailed sand table model of the battlefield. For Jim, Jason and myself this is the first time we can actually visualize the ground over which the operations are to take place. As the critical times are announced, each commander involved takes his place on the "map" and walks through, identifying critical land marks or target areas.

Lt Col Baggott has two options open for the attack, straight down the middle or a surprise flanking maneuver to the North. As the final decision would only be made at first light of the following day, depending upon the latest intelligence reports of Blue Force [24th Infantry Division] deployments and anticipated reactions, the walk through is conducted

An M551, modified to resemble a Russian T-80 MBT, seeks protection from the ever watchful Blue Force *Apaches.*

for both options. As the Battalion commander of the 4th approaches a hill feature, he nonchalantly kicks over the wooden plaque denoting a Blue Force defender with the toe of his boot. I can't help but wonder if reality will be quite so simple!

On the side lines sits Lt. Mike Cooper, the artillery commander. He looks like he could launch a round down range just by picking it up and throwing it! If his rounds land as accurately as he can toss stones at target plaques [and hits them!] we should be all right. It is obvious that much of the responsibility for the success of the mission hangs largely on the shoulders of the artillery. After final questions and reaffirmation of tasks and duties, the commanders break to pass on the Warning Order to their respective troops.

After a dinner of Krasnovian steak and an update of intelligence reports, Jim, Jason and myself are assigned to our respective commanders, with whom we will ride and fight with in the dawns early light!

The Grim Reapers

Capt. Joel Tyler typifies the modern armored soldier. Lean, tanned with an easy way about him, his eyes convey a fierce determination to succeed. The fact that Capt. Tyler took a year's posting to South Korea in order to secure his position with the OPFOR only adds to his commitment. His 1st Battalion, known as the Grim Reapers, are to take position in the main body of the advance. The success of his Battalion depends much

upon his ability as a leader, just as his success depends upon the capability and commitment of each and every soldier under his command. From the gunner nestled deep in the confines of the turret, to the watchful eyes of the scouts, all have an important duty to perform. Failure of one could lead to failure of all. Among the essential, yet often unsung, components of this fighting machine are the men who keep the machine running. Desert warfare is extremely demanding upon anything mechanical. While the rest of the Battalion sleeps, the men of 2/11 E Troop, NCOIC Echo Maintenance, under the watchful eye of SFC
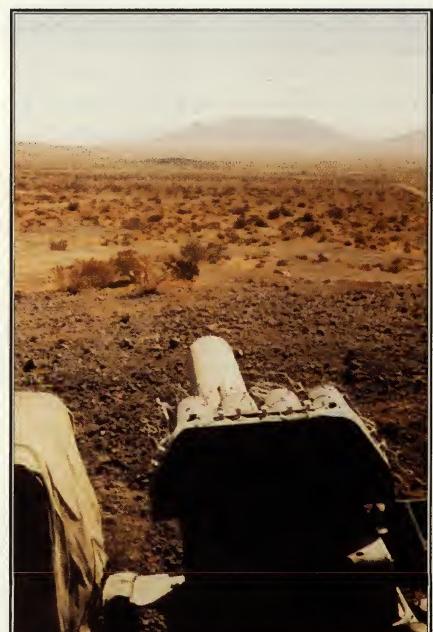
Objective achieved! From this commanding hull down position, anything that moves is dead!

Michael Smith labor on through the night, fighting their own battle to ensure that the Battalion moved out in the morning with every possible vehicle fit to fight. The powerful lights from the M578 armored recovery vehicle shine on, the only disturbance to a peaceful night under the stars - apart from the occasional roaming Coyote!

Into the Valley of Death

At first light we mount up and begin our move to the North. Intelligence reports that Blue Force has positioned itself according to an anticipated thrust down the center. It is a gamble but if we can proceed undetected

Capt. Joel Tyler (left) with PC Ace staffer John Perry, himself a former tank officer in the Canadian army, at the successful conclusion to the exercise.

along the Northern route and outflank Blue Force before they can adjust their positions, the battle will be over very quickly. Time is our worst enemy at this stage. It will take us almost 45 minutes to cross the Line of Departure. We are relying on 4th Battalion, who are going to probe the center, to decoy the Blue Force into believing we are attacking along that axis. This is the same Battalion whose commander kicked over the plaque at the walk-through. Without the support of the rest of the regiment, I fear it will be his plaque that gets kicked around!

At last we reach the LOD and commence our strike along the Northern route. The radios come alive with the warning, "Blue air in five!" and immediately all available eyes, including my own, are trained to the horizons

searching for the faintest glimpse of enemy aircraft. Blue force has a formidable air arsenal at its disposal. A-10 Warthogs and AH-64 Apaches are on call to attempt to "ruin our day"! We too have some air assets in the form of Migs [F-16s] and Hind gunships [Hueys] but the odds are against us. Talking of odds, I was always taught to avoid attacking with less than 3-1 odds in my favor. OPFOR attacks with a ratio of 1-1, a tactic not recommended for the faint of heart!

Two aircraft streak across our column! We stand helpless in our turret, exposed and with nowhere to run. Fortunately they are "friend-lies", returning from a scrap at the front, but I realize just how vulnerable we are. Slowly, oh so slowly, we continue with the advance.

And then we stop! Apparently our little ruse has been discovered and the Blue Force commander has hit the head of our column with FASCAM (Family of Scatterable Mines). Now we sit in the bottom of the shallow valley as the mine plows are brought up and clear the mine field. A-10s are visible to the front as they chew up the head of the column. Our anti-air assets burst into life, with green star clusters depicting SAMs, and the A-10s are driven off — at least for the time being. With a loiter time of more than two hours I think we will be visited again soon!

Hurry up and wait! Stationary again! This is not good, and sure enough here come

those A-10s for another attack, this time against our column! Fortunately they are firing nothing more lethal than a burst of laser, for one A-10 streaks low and slow at right angle to the column and its aiming right at my tank! This is personal! 50 cals and "SAMs" burst into action all around as the column throws up, what it hopes will be, a withering anti-air screen. We find out later that we did not die at that precise moment and someone actually shot the A-10 down. I'd like to buy that man a beer, but we still have a long way to go before hitting the bars!

On and on we advance. Over the radios we can hear the battle developing and so far things are going our way. An element of surprise has been achieved but the daunting threat of Apache attacks keeps everyone on their toes. Of all the weapons of destruction on the modern battlefield, it is perhaps the attack helicopter which commands the highest respect. It's ability to stand off, out of range of SAMs or ground fire, and pick off with uncanny accuracy anything it gets in its sights makes it an opposing commander's nightmare.

On and on we advance. Slowly we negotiate the feature known as "Alpine Pass", and for good reason. Single passage, just wide enough for a vehicle, surrounded by sheer rock walls. Two of our "Hinds" flash past at "rock top" level and our hearts skip a beat. Not a good place to meet an Apache! Eventually we emerge from the confines of the pass and can see before us the wide open plains of the objective. We're free! Tankers delight!

"There's Apaches in them thar hills!"

And then the reports start coming in. We are ordered to halt as the Blue Force has two teams of Apaches working the exit from the pass. Find cover.....where?! This is not good. Timings are being thrown right off and the artillery officer has his hands full trying to adjust to the many new requests coming in. Anti-air assets are brought up to the mouth of the pass to shield us from any attacking Apaches, but they don't need to attack. While we're pinned down, time is ticking by and Blue Force is able to reorganize the remnants of its shattered formations in the defense of the objective. We wait for the order to move out. And we wait. The low hum of the engine, the warm sun baking our faces, the constant crackling transmissions over our head sets,

lulls us into a trance. And in the middle of this trance appears a woman's voice. It sounds so soft, reassuring — and out of place! We look at each other with shocked expressions as we realize the words coming from this Angel of Death are "Near miss. Artillery! Near miss. Artillery!" In the real world we would have noticed the odd artillery round landing close by, but on the digital battlefield of NTC they rely on electronic "hints", and we need no reminding of the predicament we are in. While our driver, SPC Steven Sand, maneuvers us away from the impact area, Capt. Tyler desperately requests permission to break out of this hell hole. Eventually we are informed that a smoke screen will be dropped to cover our exit. After that it will be a flat out run for the objective with the constant threat of Apache attack.

We're off! The Battalion extricates itself from the pass and fans out in the plains below. Our anti-air assets and scouts have their hands full countering the probing attacks from the Apaches but our path is clear. Capt. Tyler swings the cupola around to face the rear and grabs hold of the 50 cal, waiting for an Apache to appear in his sights. Dust clouds fan out from the rear of our charging formation, signaling to the Blue Force that we are on our way...and that the battle will soon be over! We negotiate a gully to the front and position ourselves in a classic hull down position with the entire objective clearly visible to our front. Blue Force is ours and the umpires know it. Soon we hear the message for change of mission and we know that OPFOR has once again demonstrated its tenacious ability to press home the attack.

Many lessons were learned that day. Blue Force, while not the "winner", certainly weren't the losers. They inflicted 60% damage on the OPFOR which would have forced it into participating as a secondary fighting formation in future operations. OPFOR also learned a few lessons. Next time they "push the north option" they will probably do it differently. And we, the PC Ace staffers learned from both sides. It's good to know that our regular forces can match up to the best and hold their own. Equally, it's reassuring to know that the OPFOR is continually honing its skills which in turn makes our forces second to none.

Maybe I'll find that trooper and buy him a beer!

A column of T-80s from the OPFOR begins its early morning move to the start line.

PC Simulations of NTC

Armored Fist
from NovaLogic

Armored Fist features training scenarios from both the Army's training facility at Fort Irwin and the neighboring Marine Corps facility at Twenty Nine Palms. You'll experience desert warfare from a "first person" perspective as you take on the OPFOR in your M1-A1 Abrams MBT or M2 Bradley IFV. It's not easy! A characteristic of armored warfare is limited visibility and Armored Fist's "Voxel" graphics present a rather pixelated close-up view of the surrounding terrain, lending realism to your combat experience. Once you have mastered the NTC and Twenty Nine Palms scenarios, you will be prepared to move on to actual combat scenarios in the Middle East and other probable theaters. Good hunting!

Wargame Construction Set 2 : Tanks!
from SSI

For the budding armor god, this is the game of choice! It has been reissued in the "Definitive Wargame Collection" CD set from SSI, available in stores now. We upgraded our WCS2 with NovaStar add-on disks which include extra scenarios and some previously missing "modern" weapons systems, such as

Hinds, Avenger Hum-Vees, essential to success on the digital battlefield. Included in WCS2 is one NTC scenario. We strongly suggest you play "Blue Force" in this one, unless you particularly like reenacting Custer's last stand! While this particular scenario, an attempted screening action by OPFOR, is rather one sided, of note is the terrain. The "whale", a well known feature at Fort Irwin, is faithfully reproduced.

The WCS2 offers an incredible scenario builder option with great flexibility in terrain, Order of Battle and placement set ups. We have spent more hours than we care (dare!) to admit reliving our NTC simulations head-to-head with WCS2. Create an OPFOR reconnaissance platoon with BRDM's and BMP's and check out the defending positions, or build an entire Motorized Rifle Regiment and attack the defending armored cavalry using your T-80's (and T-90's!), Katusha rockets, artillery, Hinds and more as you "take ground" at all costs!

WCS2 with Nova Star add-ons will completely satisfy the needs of any true armor god, as you smell the cordite, taste the dust and feel the ground tremble beneath your tracks......need we say more?

Battleground Ardennes
Just who, is winning this War?

by Brian Workman

The sound cuts through you like a knife and grates on your bones even worse than the bitter cold. Standing up to peer through the morning mist you see nothing to explain the low rumble mixed with the sound your dad's car made when the wheel bearings went. Someone runs up from behind, and when you turn the Sarge punches you off your feet and back down in the cold, wet hole that you call home. "Get down and stay down!" He yells, "German tanks are attacking!" That eerie sound as you will later learn, was your first memory of The Battle of the Bulge.

to historical accuracy, they have literally woven it throughout the entire fabric of the game. The scenarios feature precise troop dispositions, excellent replication of the topography, and can take from a half hour to days to play, with each turn representing 10 minutes of real time.

Twenty-six scenarios are provided, including three large battles. The map scale is approximately 250 meters to the hex, and can be viewed in four sizes. This enables the player to focus in tactically on a small unit engagement, or to focus out for an opera-

The 3d view is a nice touch

Battleground Ardennes is the first in Talon Soft's Battleground series of games and is an excellent tactical simulation of the German winter offensive. The designers have not just given a nodding acquaintance

tional viewpoint in the larger scenarios. Individual units are platoons, which forces the emphasis toward tactical vice strategic thought. Players may opt to be either the Germans or Americans playing against the AI, another individual by hot-seating or by

modem, or allow the computer play itself to learn the flow of a given scenario.

The difficulty is such that it is almost impossible to jump right in and start playing. Talon Soft installed a training scenario for good reason, and you will need it along with the player's handbook to accurately grasp this game. Gameplay flows through several phases, including four fires and two movements. Starting with Prep fire, and then progressing through movement, defensive fire, offensive fire, Assault, and finally to the mechanized phase. This may seem like a lot in a 10 minute turn, but only to those who haven't experienced the tempo and intensity of combat first hand.

The scenario editor allows you to create battles on any of the maps contained in the database (there are three), provided the size of the forces is below the Division level. The number of turns, the time of day, date, and weather (winter only), aggressiveness, and Victory Points for each side are selectable. The ability of the scenario editor to extend play is limited, if you want real accuracy, by the maps. If this is not a concern then it should not be a problem to create almost any battle, as long as you stay within the previous constraints.

How about some pointers on beating the game? The AI tends to choose shooting over moving and thus misses the chance for tacti-

cal advantage occasionally. It also shows this weakness by worrying more about the objectives than tactical positioning (In other words, it suffers from short-term vision). The Artillery can be devastating against soft targets in the open, especially the American M7 Priest. The German tanks can be hell, but the American Infantry can cut them down to size in Assaults.

The actual WW2 video in the game is graphically appealing, but seriously slows down gameplay. Thankfully Talon Soft thought to allow the player the ability to shut this feature off, by using the options menu of the game. This speeds up the play considerably. The smallest map view(Zoom In), has an excellent 3D look to it and stands out from the crowd of other games for this period, but it is difficult to pick out your units on this view due to the color choices used on the palette.

Although Battleground Ardennes hasn't redefined the face of wargaming, it certainly is a solid offering from a newly formed company. Keep an eye on Talon Soft, for it is staffed by a lot of talent that helped build
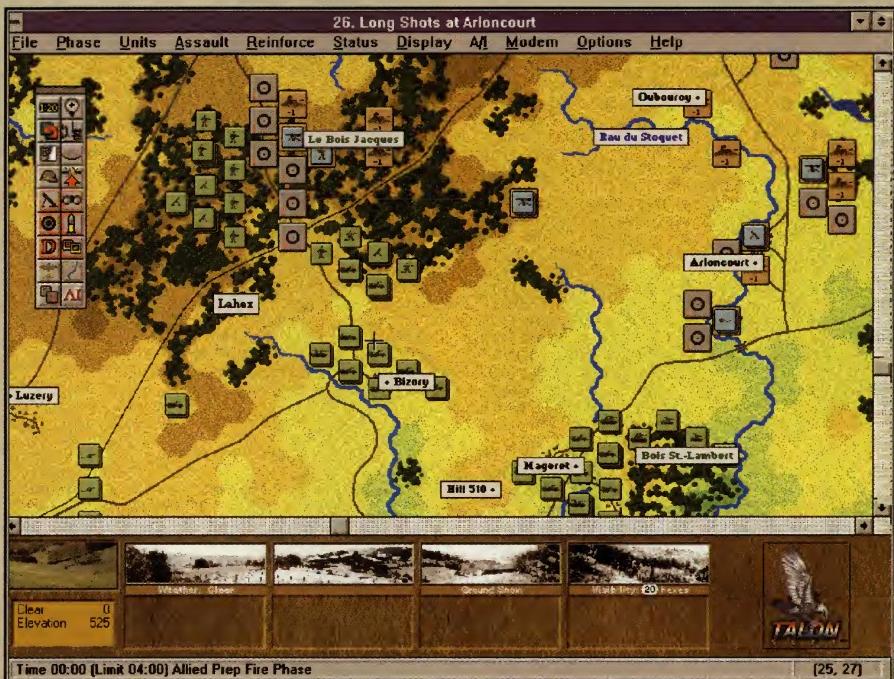
The scenarios can be quite involved.

other companies. If they remain true to the vision, they might yet set a new standard for others to follow.

A Ranger's Work Is Never Done...

"Wild Bill" Stealey's Interactive Magic outdoes themselves with their new release, *Star Rangers*. This game combines a beautifully designed space flight Sim with enough arcade style action to rivet the player into their flight seat.

Star Rangers puts players into to role of a 23rd Century border patrolman. The advent of Warp technology allowed the human race to efficiently expand into space. This rapid growth outstripped the ability of the government to oversee the colonies, most of which were set up by major corporations. The Star Rangers' initial job was to police these colonies, much like the Texas Rangers of the American west.

As humans expanded farther into space, contact with alien races was inevitable. Unfortunately many of these contacts were bloody and the Rangers were often the only protection the colonists had. Eventually, a treaty was signed between the humans and three of their closest neighbors, effectively ending expansionism. This relegated the Rangers to the role of a border patrol.

Armed with the best weapons and technology mankind can provide, the player faces the task of keeping the borders safe from incursion in addition to patrol, escort and search and rescue missions. With the benefit of only one wingman, players must outsmart and out fly their opponents to stay alive and defend innocent civilians.

The missions vary in scope and objective but one thing stays constant, intensity. The action is fast paced forcing players to make crucial decisions on the fly. One is often faced with the difficult choice of docking for badly needed repairs and supplies or going to the aid of besieged colonists. The wrong decision could prove fatal. "The really exciting news, however, is that all of the missions in Star Rangers are randomly generated so players can immerse themselves in this space Sim and never fly the same mission twice." said Interactive Magic Chairman, "Wild Bill" Stealey.

Game control is intuitive and supports a multitude of flight sticks and weapons controllers. The cockpit display is simple and easy to comprehend, allowing the player to choose what information is displayed instead of force feeding an overload of data.

Star Rangers provides a training mode to familiarize players with weapons and flight characteristics before entering the fray. Each mission begins with a briefing followed by a screen where players may select their wingman. Each wingman has different abilities and skills. After looking over their bios and choosing the best one for the mission, both ships launch.

The beginning of each mission usually places the player in a hot zone which must be cleared of enemy vessels. Once the immediate threat has been neutralized, the player must then consult their map to locate the next target. While in map mode, the game displays an overview of the quadrant being patrolled including friendly bases and ships. If enemy ships are within sensor range of friendly forces, they are also displayed on the map. Dropping transponders during flight will increase the "visible" areas of the map. To quickly cover large distances, simply click on an area of the map then engage the warp drive.

When confronting the enemy, careful consideration must be given to energy sup-

plies. Running out of energy not only leaves a craft with only missiles for defense but also shuts down the engines. Precise placement of shots and short warp jumps can help conserve energy and increase flight time.

Rangers will enter every confrontation outnumbered and must use their wits to even the odds. The use of long range weapons is critical when approaching targets. This will help to thin out the enemy before the dogfights begin. Use of missiles on groups of enemy fighters is also a good idea. Targeting a missile on the center ship in a formation can cause collateral damage to those around it and, in some instances, even destroy them. Dogfights are generally quick and deadly. Loss of concentration equates to loss of life. It is this type of intense interaction that makes *Star Rangers* a hit with experienced space jockeys and newbies alike.
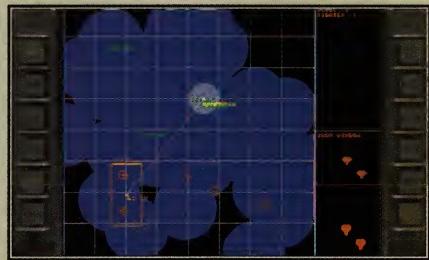
On Target:
Clean smooth graphics.
Random mission generator
Energy consumption also effects engines
Engagement priority is up to the player
Very detailed manual

Missed the Mark:
Requires a high end machine to run smoothly

High Velocity:

The Mile High Club Provides a Great Introduction to Flight Sims

by J.P. Withers

There's something about the notion of climbing into a multi-million dollar piece of state-of-the-art destructive power and toasting the enemy that obviously strikes a chord in the collective gaming consciousness. On the downside, however, is the daunting reality that most contemporary flight sims require users to spend serious time in the virtual cockpit to earn their silicon wings. At the high end of the process, users must deal with flight and combat characteristics that are modeled in scrupulous detail, making mastery of these games a very complicated proposition. Let's face it, there is a *reason* the military trains pilots for over a year before they let them fly the real thing.

Nevertheless, ask any die-hard silicon jet jockey and they will tell you that, deep inside of them, they believe they could make the transition to the real world under the right circumstances. What kinds of circumstances? How about an empty cockpit at a local air show with a chance to show off for the Budweiser Girls, or something equally heroic. Anyway, the point is that this product is not for veterans, who would better spend their time reviewing Energy Management or Flight Comm procedures elsewhere in this issue. Rather, this is a combination pack that should appeal to both novices and nostalgia buffs:

The Mile High Club Flight Pack (and get your minds out of the gutter *right now*) is a set of 8 CDs that run the gamut of the flight sim experience at an affordable price. Although none of these offerings are state of the art, it is a very good collection of older gear that still packs plenty of bang for the buck.

Wing Commander

Wing Commander is the classic space dogfighting simulation. The player progresses though a number of missions to finally get a shot at taking out the evil Kilrathi base and making the Vega Sector safe.

During the course of a career, a pilot will have 4 different ships and numerous weapons systems under their control, so the game doesn't easily get stale. There are also a number of different wingmen the player will fly with, each of whom possesses their own personalities and flying characteristics. It can be as challenging to control the wingmen as to fight the enemy.

The performance of the player changes the ongoing back story of the game, and an entire war can be lost or won based on how well the player flies, giving an interesting flavor to the game.

Wing Commander Academy

This is basically a *Wing Commander* scenario builder. The player can construct a mission with a number of different enemies and natural obstructions to choose from. Once the scenario is complete, a ship and wingman are picked and the scenario is flown.

While there are a few more options for ships and bad guys here than in *Wing Commander*, and the flight model is slightly smoother and faster, the fly and fight nature of the game removes much of the charm that was in *Wing Commander*.

Mig-29

Spectrum Holobyte's simulation of the Mig-29 Fulcrum Russian airframe is by far the most realistic simulation in this package. As such, it can also be the most difficult. The plane itself is very finicky due to the realistic flight model and will side slip when banked too tightly and can easily stall when a careless pilot looses too much velocity. Also, blackouts and redouts occur frequently when pilots push their envelope too hard.

But *Mig-29* is far from just a fly and fight game. The player is in command of an entire squadron of Mig's and as such has to assign planes and pilots to various missions in order to achieve overall strategic goals.

Wing Commander is the Grand Old Man of space combat sims.

Wing Commander Academy isn't as deep, but here in the scenario editor you can create custom missions.

The excellent displays in F-14 Tomcat make control easy.

Mig 29's instant action mode gives plenty of ammo for a low reality shoot'em up.

In Megafortress almost everything on the screen is a mousable control switch.

This lends a feeling of real control over the direction of the game.

Mig-29 also supports modem play and high end flight sim controllers, such as Thrustmaster WCS, Thrustmaster FCS sticks and CH Flightstick Pros. All in all, this is a solid flight simulator and provides the new player with a taste of what realistic flight sims are all about.

F14 Tomcat

Activision's Tomcat provides a good feel of being a naval aviator. While there is nothing to this game but straight fly and fight runs, the novice pilot can get a feel for the F-14 airframe and get a crack at "the hardest job in the world," landing on a carrier flight deck. The on-disk manual for this game is excellent and gives a great introduction to combat flying, a player should look at this manual if nothing else, because it will help in playing all the other games.

Heroes of the 357th

This game recreates action over Europe in a P-51. While there are no takeoffs or landings—you start in mid-flight—the flight model is pretty good, giving a great feel for how hard it

is to acquire and keep a target without the benefit of modern electronics. This game is a lot simpler than some of the others in this pack, and still manages to pack in a solid fun experience.

Jet Fighter II- Advanced Tactical Fighter

Velocity, the company that put together this package, produced JFII, and while it isn't the most realistic of the group, it does allow the potential pilot to fly a number of different planes, from the F-22 and 23 Advanced Tactical Fighters to an FA-18 Hornet. There is also the added bonus of the flight operations being held in southern California, allowing the player to blow the heck out of a good deal of California landscape. Hey, why not, everyone knows how overpriced the real estate market is there, right?

ATAC

This game centers on anti-drug warfare in the near future. A squadron of F-22's and AH-64 helicopters are assigned to Columbia to combat drug lords. The simulation isn't the best, but it is adequate and this is the only game in this pack that gives you the chance to fly a helicopter. This game is also good in

that it doesn't have preset scenarios. Instead, the player must read intelligence reports and decide what target to hit to reduce the enemy's power.

Megafortress

The ultimate in anal retentive software, Megafortress simulates flying a B-52 in combat. However, to properly simulate this low-reflex task, 360 Software, who designed the game, have added mind numbing operational detail. When you have to worry about turning on your batteries and lights manually, you know this is a detail-oriented simulation. However, hardcore flight simulation fanatics live for this stuff, and this game is a good indicator to tell if a player is a seriously psychotic detail fan or just a hotshot Sunday flyer. Not as fun as Slim Pickins in Dr. Strangelove maybe, but you won't find another game like it anywhere.

The Mile High Club is the perfect introduction to flight sims for the millions of new computer users out there. And for all the experienced pros: check six, a new generation of flight sim Aces could be sliding up right behind you.

Heroes gives fairly good graphics to go with a decent flight model.

The Radar Display in ATAC is excellent in showing relative location of targets.

Good scenery rendering allows tricks like flying under a bridge with Jet Fighter II.

Conqueror A.D. 1086

Chivalry Returns (Almost): *SIERRA* Picks Up the Gauntlet but Drops the Scribe

by Bernard Dy

For gamers who remember the days of Cinemaware, *Conqueror A.D. 1086* ought to bring a smile. Back in the age of the 286 PC, *Defender of the Crown* was probably the best game *Cinemaware* ever made. Players took control of a knight in a medieval setting. There was the usual movement of troops across a map, plus action sequences involving castle storming and jousting at tournaments. It was a wonderful blend of action and strategy.

Of course, in those days, the graphics could only allow so much detail. Now, *Software Sorcery* invites gamers to a day of not-so-old where knights are bold and look pretty good in 640 x 480 resolution.

Like the *Cinemaware* classic, this product puts the player in the shoes of a knight. Gamers must develop their starting territories and can participate in tournaments to win money and prestige. *Conqueror*, however, goes far beyond initial parallels to *Defender of the Crown*.

There are two different ways to win. One is the conventional strategy/wargame method involving a war of attrition against neighboring castles and fiefdoms. Although this doesn't promote personal popularity, one is generally respected provided the size of one's army remains sufficiently high. The other way to win is to earn the title of King's Champion by killing the dragon which terrorizes the land.

Conqueror is one of a few games to try its hand at being a conglomeration of gaming genres. It features a SimCity-like model for things like building and maintaining fiefs and castles, a DOOM clone module for small unit melees, a beautifully illustrated miniatures wargame segment for large field battles, and a first-person point of view jousting game.

Usually, when a game tries this "jack of all trades" approach, each component suffers. Conqueror continues this pattern. In the field battles, it isn't always possible to scroll the screen far enough to see all of the units. Also, while the DOOM-like melees are lots of fun, and pioneer the feature of using multiple computer controlled allies, the other knights are obedient but not very smart, and often get in the way.

The fief building module is just strange. Players are given four different screens to manage village, farm, castle, and forest (mining and logging). They are not combined as one might expect, and many of the structures that can be added to fiefs are not document-

ly if they enjoyed their days as defenders of the crown.

Conqueror 1086 is an attractive blend of strategy and action. Horribly sparse documentation and AI quirks are problems, but role-playing elements keep the game interesting.

On Target
Multiple objectives
Role-playing elements
Variety of graphics

Missed the Mark
Documentation is incomplete
Mediocre AI in melee segments

ed, so discovering their value is a matter of trial and error. After conquering other fiefs, it is nearly impossible to figure out how to manage them. It appears those acquired through battle exist only for prestige. The economic model is thus somewhat a mystery and relationships between entities are also ignored in the documentation.

Yet *Conqueror* is often charming, thanks to a wonderful sense of adventure and some role-playing features. Besides becoming the leader or hero of the lands, the player character has ratings in such things as strength and honor that can be improved, particularly at tournaments. During these galas, knights can converse with other knights and maidens to further their personal ambitions. These conversations are often intriguing and can lead to informative gossip. Overall, the role-playing elements are most important to those players who eschew the pure combat and conquest model in favor of pursuit of the dragon.

The interface is easy to learn and utilizes both keyboard shortcuts and the secondary mouse button. On the main travel map, however, the character travels slowly through different terrain. While the terrain is nicely illus-

trated and even changes with the seasons, movement should be easier. Even with an adjustable speed setting, gamers must still micro manage their marker to avoid getting bogged down in dense forests and rivers.

The game seems technically solid on a 486DX2, though mouse response was somewhat spotty. The audio is very good, especially the CD tracks. The sound effects of swords clashing and knights grunting during melees are hilarious...and infectious.

Conqueror went through a long gestation period, having switched publishers late in its development. This may be the cause for some of its rough edges and novice gamers might find them frustrating. Veteran gamers with the experience and patience to decipher *Conqueror* may find it entertaining, especial-

Frankenstein:
Through the Eyes of the Monster

by James R. Jones III

With horror games rapidly becoming a hotly contested high-ground of CD-ROM entertainment, Interplay has launched the latest challenger into the fray, *Frankenstein: Through the Eyes of the Monster* on CD-ROM.. This first person adventure is a chilling recreation of Mary Shelley's classic novel *Frankenstein*, but with a notable twist...players assume the role of the monster. Featuring the acting talents of film star Tim Curry as Dr. Frankenstein (whom players will recognize from movies such as *Congo* and *Hunt for Red October*, and especially *Rocky Horror Picture Show*), the game makes good use of video for dramatic effect.

The storyline is a unique rendition of the classic tale. Dr. Victor Frankenstein has discovered a new element that can re-animate dead tissue. He experiments with this material, called Life Stone, and re-animates a compilation of body parts and a brain and creates the "monster.". With little more to go on than distant memories of a previous life (including a quick trial, sentencing and summary execution), players must piece together a goal and purpose which unfolds over time. Warning: *Frankenstein* is not for the meek or anyone who is put off by blood, gore or other stomach wrenching graphics. Even veterans of other graphic tales will be surprised and perhaps shocked more than once as they solve this horror mystery.

Horror aficionados will enjoy the archaic equipment of Frankenstein's laboratories, the dark and murky surroundings and the heroic figure Dirt. Dirt will likely become a favorite cohort as players piece together and test some of Dr. Frankenstein's experiments through acquiring his notes and the powerful LifeStone material. The good doctor and his henchmen will try to stop gamers along the way and death comes swiftly to the unprepared. Another twist involves a separate quest for the monster to re-animate his daughter.

Players discover that their brain is in the body of a man accused of murdering their daughter, Gabrielle. To bring her back to life, one must locate her body, build a LifeStone crystal and use Frankenstein's resurrection lab as skillfully as the good doctor himself. Despite the clues scattered along the way, it is impossible to solve the quest without exploring virtually all of the castle's more than 100 rooms. Some of these locations seem to exist solely because they were created at some point in the development process. As such, the game may be tedious and perhaps too challenging for less patient players.

Intricately rendered SVGA screens, reminiscent of *7th Guest*, form the backbone of the gaming environment. Video clips support the storyline well, but the quality of the video is grainy and fuzzy, a limitation of using QuickTime for Windows. The interface is a straightforward point-and-click template familiar to adventure gamers. The rooms are gorgeous and set the mood for exploring Frankenstein's castle. Odd-looking equipment, partially completed experiments (including body parts), as well as secret doors, compartments and tunnels add to the properly oppressive environment of being in a mad scientist's laboratory. Dr. Frankenstein and some of his creations act as guides or clue-givers as players seek

The sound effects and music are compelling. Creaking doors, rattling chains and other appropriate dungeon paraphernalia add a chilling touch to the already foreboding exploration of Frankenstein's lair. Over time, one begins to empathize with the monster as Frankenstein taunts the monster and is forever scribbling down his/your achievements on a clipboard.

Interplay's *Frankenstein: Through the Eyes of the Monster* pulls together the components of a classic horror story, adds fresh treatment and original story twists, electrifies the creation with video clips and hot SVGA graphics and breathes new life into horror gaming. So wait for a windy, rainy night, grab a big bag of popcorn and turn the room lights down and the brightness controls on your monitor up. You're in for a good, old-fashioned scary night.

more and more information about the doctor's experiments, the castle and the local gentry. Digitized sequences of the monsters thoughts and memories give important directions to keep players on path. In fact, without these sequences, it would be very easy to become lost in this game. The inner voice of the monster replicates his thoughts and conscience, and also keeps players focused on objectives, and warns them away from acting in a monstrous fashion.

quently, the game will unfold differently the next time. With so many room "visits" to experiment with, *Frankenstein* is a full-bodied interactive movie that will take some time to complete.

Thorough exploration of the environment is essential to success, and saving the game along the way is VERY important. Poor decisions early on can have severe consequences later. Puzzles, mazes and other obstacles await as one explores the detailed world within or near the castle walls. Similar interactive adventure games have relied on puzzle-based challenges which are often based on sheer luck. The challenges faced in *Frankenstein* are mainly based on gaining knowledge within the context of the game and require that one masters the environment. Multiple endings and changing dialogue keep the game fresh for replayability. One of the neat innovations is that, if one gets killed, and this can happen fre-

On Target
Quality Scripting and Acting
Variations on original theme keep the story fresh
Unique player point of view

Missed the Mark
Grainy video
Redundancy in Environment design

Battles in Time
Is it New Years already?

by Brian Workman

Far in the future, seeking the ways of peace and harmony, humanity destroyed all weapons and knowledge of war. Many generations later the world formed one large utopian society. But this tranquil nation never foresaw the horrible fate that now descends from the stars. The only way to survive was to relearn that which was shunned by their ancestors' generations ago. And so it was decided . . .

EARTH IS SAVED! You have defeated humanity from the evil aliens at that most hopeless of times. Your name lives on in history as THE GREAT DEFENDER.

The greatest minds united to invent a machine that would be key to saving the world. Now, one could travel into the forgotten past to prepare for what could be a bleak future. The candidates are selected for the trip

THE GREATEST MINDS UNITED TO INVENT A MACHINE THAT WOULD BE THE KEY TO SAVING THE WORLD.
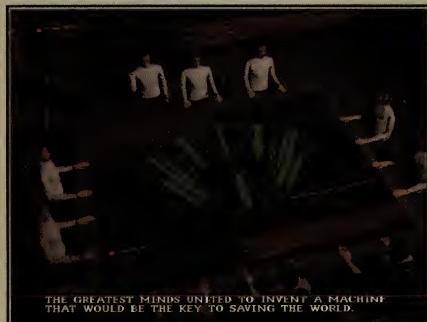
back in time, and you are one of them. Only the best individual of those that survive, will be chosen as Earth's general to defend against the aliens.

To become the chosen one, you must first prove your prowess in 12 separate engagements, 3 from each of the following time periods: pre-historic times, the Roman era, WW 2, and a hypothetical future war in the year 2025.

Battles in Time supports from 1-4 players against the AI by hot seating, or 2 players by modem or null-modem cable. A campaign option is also featured, but it offers nothing beyond the base scenarios. Essentially, the campaign starts with a randomly selected battle from each era, and then progresses to a battle or battles against the aliens upon reaching the rank of Earth General. Possible supplemental battles and campaigns could appear later according to QQP.

Battles in Time uses a turn based engine sans any of the more sophisticated wargame design elements. The tactical concept is not much more than a child's capture the flag game. All objectives revolve around taking and holding cities. These cities provide rebuild points and the secondary goal is to build a bigger economic base than the opposition, thereby sustaining larger armies over the long haul. A secondary way to win is to eliminate the enemy Headquarters units, as in Stratego.

There are three distinct phases to each turn, Replenishment, Movement, and Tactical. Each player moves through all three phases before the next player starts, which is much less satisfying than simultaneous turn resolution. In the Replenishment phase, the player buys and repairs units. These units are Headquarters, Armies, SDU's (Self-Defense Units), Camouflage, and Recon sized forces. These forces, range from dinosaurs and cavemen in pre-historic times to tanks, floaters, and hovercraft in the futuristic scenarios. The second phase is Movement, and is pretty standard for this type of game in that it is influenced by terrain and unit type. Unit selection occurs either in order or randomly with the mouse, and the player then decides where to put them based on each unit's available movement rate. Tactical, the third and final phase, is where all battle takes place. Battle determination proceeds on the individual unit level or the AI will resolve it for you.

Gameplay is fairly simple but reading the manual will provide insight into some nuances of play that would not otherwise be obvious. How long does it take to play? It depends on how much the player does individually or lets the AI handle. A battle could take anywhere from a half hour to several hours depending on the level of player involvement. The Campaign should take at least a day to complete or about eight hours of playtime.

PREHISTORIC AGE

Battles in Time has an interesting premise but, unfortunately, it wasn't developed to its full potential. The quality of the AI routines are also substandard. As Spock would say "the attack patterns indicate two-dimensional thinking." As such, once players have invested the day or two needed to master the nuances, any surprises that the scenarios might have presented evaporate into nothingness. Even the end battles against the aliens are disappointing as they are nothing more than the same old story with new characters. Also, the game's graphic presentation lags behind the entire industry. All of these factors are unfortunate because, when QQP first released The Lost Admiral and the original Perfect General (not to mention Conquered Kingdoms), they were a hot new group that showed lots of promise. It is apparent that original competitive edge has dulled, and it is probably time to re-tool and re-think if they want to regain the stature and respect they once enjoyed within wargaming circles.

The Flight Simulator Pilot's Guide to the Caribbean, Part 2

by Rick Lee

This is the second in a series of articles to help you explore the *Microsoft Caribbean* scenery add-on with your Cessna 182RG in *Microsoft Flight Simulator.* In the original article, it was recommended; first, use *Caribbean* with version 5.1 of *Flight Simulator* to see the special water textures; second, use World

Out Islands, the same as you. In the Bahamas, "Out Islands" refers to islands other than the two most populated; New Providence (Nassau) and Grand Bahama (Freeport).

Leave Nassau on a general heading of 130⁰ and climb to a comfortable altitude but remember that when flying easterly on a VFR

You and the catamaran are headed out for a day in the "Out Islands".

Aeronautical Charts to navigate; and third, explore from point to point as if flying in the real world to enhance the feeling of being on a journey.

In the first article you flew from Miami to Nassau. Preparing to leave Nassau, you will want to set your winds again with a gentle breeze out of the Southeast as is realistic for the region. Use clouds only if your system can maintain adequate frame rate. Take off from the runway of your choice and keep the Cessna below 1000 feet as you fly to the southern end of the island. There is a marina on the southern end with a straight section of beach sand. If you look closely in that area, you may find a Catamaran leaving the marina for a day in the

flight such as today, we fly at ODD thousands plus 500 (EVEN thousands plus 500 for westerly flights). As you head out over open water, keep the VOR tuned to 112.7 (Nassau), set your OBI to 130⁰, intercept and maintain that radial.

After 40 nautical miles, you should hit the Exuma Islands. If your navigation is correct, you arrive at Norman Cay, a private airstrip in the northern part of the chain. Head south at approximately 140⁰. There is no need to watch the compass though. You can easily follow the chain of islands visually because there is shallow reef between them and the islands are quite close together. When flying down a chain, it's customary to

fly to the right of the islands. This separates traffic as on a highway and helps you to see the islands out the pilot-side window. Take note of the deep water to the east of the chain. This is Exuma Sound jutting into the Great Bahama bank. Shallow and deep waters are just as important as the land masses for visual navigation in the islands.

At 75 DME from Nassau, you will arrive at Staniel Cay, one of only two airstrips in the Exumas that welcomes visitors. Staniel Cay is famous for locations used in the James Bond film, Thunderball. All you will find in FS5, however, is a hotel, radio tower, and cabin cruiser. Our flight plan takes us east from here but, if you like you can continue southward to see the many small private islands and airstrips in the chain as well as the more populated Great Exuma Island, home to Exuma International Airport.

Leave Staniel Cay on a due east heading. After 50 miles you'll pass over the large, hard-to-miss, Cat Island. Don't miss "The Hermitage". It looks like a church, but it is actually a 200 year-old home built by Father Jerome, a missionary to the Bahamas. It sits on Mount Alarena, the highest point in the Bahamas (only 200 feet!) between New Bight and Cutlass Bay on the eastern coast. The building is difficult to spot from above so fly low. When you are ready to leave Cat Island, tune in San Salvador NDB on 281 and head east again.

It is about 40 nautical miles to San Salvador. To keep yourself occupied, practice calculating your time enroute by making measurements on your chart. When you are traveling at 145 knots, you'll be making 145 nautical miles per hour in still air. Correct for your wind components also. Note that the WAC charts have scales for Nautical Miles,

Statute Miles and Kilometers on the white border. When navigating among the islands, it's important to know when you expect to make land. If you miss San Salvador, the next stop is Africa! If you don't make land when you expect, it's vital to get your bearings with radios or turn and go back.

When you reach San Salvador, the island traditionally thought to be Columbus' first landing, tour the western shore low and slow. You will see the Columbus Landing monument and offshore is a reproduction of the Santa Maria!

Fly due southwest (225^0) 20 miles to Rum Cay with its 2400 foot crushed-coral runway. Proceed southwest another 20 miles to Long Island. You can follow the island southeast to its end. From the southern tip of Long Island fly a 100^0 course 25 miles to Crooked Island. Follow Crooked and the Acklins to the south. From the southern tip of the Acklins, you should be able to tune Great Inagua NDB on 376 and fly directly to it. This is a long flight of 75 miles at 160^0. About halfway, you should see tiny Northwest Cay. Approaching Great Inagua, notice the tethered radar balloon on the north coast and the massive white salt fields belonging to Morton's.

As you leave Inagua, you are also finally leaving the nation of the Bahamas.

Southwest from Inagua 60 or 70 miles, you'll run into the large island of Hispaniola, on which are the nations of Haiti and the Dominican Republic. Skim along the northern coast of Hispaniola to its eastern tip. This will be a sightseeing trip of nearly 200 miles. Close-by to the east is the U.S. Territory of Puerto Rico. Tune the Borinquen VOR on 113.5 and make a direct route to it. When you pass Borinquen, change your OBI to 120. At 20 miles on that radial, you will see the massive Arecibo Radio-Telescope. You may need to climb to 6000 feet to properly see the natural dish-shaped land feature.

Continuing along the north coast of Puerto Rico, you will reach San Juan with its many sightseeing treats. On the eastern edge of the city is the magnificent Spanish colonial fort, El Morro. Land and tie down at Isla Grande Airport. In the next article in this series, you'll be on your way to South America!

(Above) A replica of the Santa Maria at the site of Columbus' first landing in the New World. The history of the West Indies is extraordinarily rich.

"(Below) The Hermitage‹. The 200 year-old home of Father Jerome

(Below) The Exuma Chain of islands is as easy to follow as a highway in the sea. Stay to the right!

(Above) The splendid, ancient El Morro. Colonial Spanish fort guarding San Juan harbor.

Tornado Command and Staff College

Shareware, user-made add-ons extend Tornado's service life

by Tom "KC" Basham

Tornado by Digital Integration never really met the kind of success such a well-developed, hard-core flight simulation deserved. Its sales in the US were mediocre, despite being an excellent product. *Tornado*, like all simulations, has flaws but certainly none severe enough to warrant pushing it into the cellar with *Pacific Strike*. Some argue that *Tornado's* complex avionics were too "hard core" for the market, although the success of simulations like *F-15 Strike Eagle III* and *Fleet Defender* tend to discredit that theory.

7Mbyte collection of tips and tactics collected into a *Windows* help file—a hyper-text strategy guide, if you will. Offered as $10 shareware, the trio built a web page at http://www.mindspring.com/~ejoiner/tcsc.html from which users can download the 2.6Mbyte zip file.

During the 1991 Gulf War, RAF Tornadoes performed some of the most difficult and dangerous missions of the war, especially during the early days. Tasked with closing heavily defended Iraqi air bases, RAF Tornadoes suffered disproportionate losses

a difficult challenge to *Tornado* players. *TCSC* teaches mission planning, resource allocation, and strike pilot tactics to the armchair jet jock. Complete with mission examples, *TCSC* provides an excellent shareware strategy guide. Originally intended as just a Frequently Asked Questions (FAQ) file, *TCSC* grew into a full fledged tactics manual. *TCSC* provides lectures and examples on many topics, including: terrain masking, making effective use of weather patterns, weapons uses and selection, flight planning, strategic targeting,
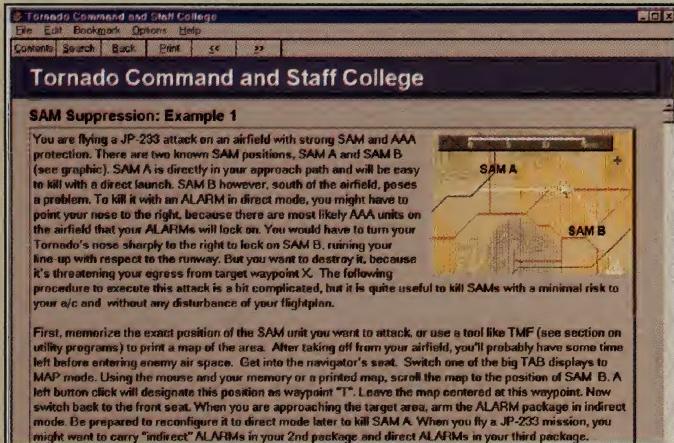
Others argue that ground attack aircraft just aren't as sexy as air-to-air fighters. Still others argue that the US market prefers "American Iron." Whatever the reason, *Tornado* missed most of the glory it deserved. Thanks to a group of highly dedicated fans, however, a group of user-made add-ons are breathing new life into *Tornado*.

Basil "Sweet" Copeland, Eric "Cougar" Joiner, Jr., and Heinz-Bernd "Bicycle Repairman" Eggenstein launched the biggest salvage operation. Long term members of CompuServe's Flight Simulation Forum (FSFORUM), these three individuals created the *Tornado Command and Staff College (TCSC)*, a

during the opening days. The Tornado fits in the same class as the F-111 and the F-15E, designed to penetrate deep into enemy territory and neutralize tactical targets. Some argue that the losses during Desert Storm indicate the Tornado failed when put to the task. A few sorties in the *Tornado,* however, helps illustrate the daunting task faced by the RAF crews. Just about any aircraft can operate successfully when two to three dozen support aircraft clear the skies and neutralize enemy ground forces beforehand; few do as well when sent in the lion's den alone.

Digital Integration's *Tornado* reproduces the combat environment quite well, presenting

artificial intelligence of enemy commanders as well as game quirks and bugs.

As is wont to happen on the World Wide Web, Tornado players made their way to the *TCSC* web page and interest in *Tornado* itself experienced a revival of sorts. Copeland, Joiner, and Eggenstein saw a market and proceeded to fill it. Upon registering *TCSC*, users receive a password granting access to many other user-built add-ons. These add-ons include a winter landscape, night vision goggles, and tools to exchange missions between players among many other types. Once the user registers *TCSC* for $10, they receive access to *all* these utilities.

Joiner, Copeland, and Eggenstein have another interesting project in the works: *Virtual Fighter Command (VFC)*. Basically, groups of Tornado pilots gather into "electronic squadrons" and effectively play *Tornado* campaigns via e-mail. Several *Tornado* squadrons have sprung up, all using Joiner's web page http://www.mindspring.com/~ejoiner/vfc/vfc.html as Command Post for their virtual war. Pilots in various squadrons fly a single mission, then the campaign files are passed to the next pilot (who may or may not be in the same squadron) who flies the next mission. The process seems fairly popular among *Tornado* players, with several squadrons already formed on the various online networks.

Be advised, *VFC* is not necessarily for everyone. First, it appears pilots *must* have web access in order to receive mission orders and flight assignments. Second, *VFC* requires proven piloting *and* mission planning skills. In order to participate in VFC, you must have completed at least one level 2 campaign with victory in a European Theater. Preferably, candidates should be at Group Captain level with at least 2 victories. *VFC* isn't meant to exclude

anyone, though. Rather, *VFC* attempts to ensure that everyone has an equal amount of enjoyment while still achieving victory. In this case, that means defining a minimum skill level for aspiring *VFC* pilots.

Copeland, Joiner, and Eggenstein have put together an impressive add-on package to *Tornado*, certainly rivaling the complexity of

any user-made add-ons for *Falcon 3.0*. Unlike some shareware products which demand enormous licensing fees for relatively small software packages, the $10 *TCSC* licensing fee provides *Tornado* players with a wealth of add-on products. Anyone who enjoys playing *Tornado* should check out the *TCSC* and *VFC* web pages!

"G" Whiz

by Tom "KC" Basham

Most aspects of flight lend themselves to mathematical representation on the computer. It's easy enough (although rarely done) to program the basic equations of motion and the aerodynamic characteristics of an airplane, a missile, or whatever. Armed with information, users verify the validity and

"worse" than 2g, but by how much? Not everyone reacts the same under G-load. In fact, a single pilot will experience different effects depending on how much sleep he got the night before, how well he's feeling and his dehydration level. Studies indicate that being dehydrated to the point of just beginning to

experience -1.5g to +8.5g during mock air combat as well as aerobatic flying, I will now detail my experiences, how they stack up to fighter pilots I've spoken with, and how it all compares to our flight simulations.

The bulk of my "G time" occurred in a T-34 Mentor, a prop-engined, tandem seat trainer used by the USAF and USN for years. Flying at Sky Warriors in Atlanta, GA, I have accrued approximately 24 hours of mock dogfighting in the T-34. These weren't joyrides, but actual combat engagements using a "laser tag" system to record hits while an instructor pilot rode in the backseat, teaching combat tactics and making sure everything remained safe. During these engagements I experienced from -1g to +6g, pushing the T-34's specified structural limit of +7g.

I recall quite vividly my very first hop. Flying against my good friend Greg "Tweety" Prete, we flew to the op zone and began a series of "g warm-up" maneuvers. My instructor performed a 3g barrel roll and it seemed my world was coming to an end. I knew enough to strain my lower body muscles, forcing blood back in my head, so

The gun camera does not lie!

accuracy of the flight model by comparing numbers generated in the simulation with those obtained in "real life." Some aspects, however, do not fit neatly into mathematical equations. In particular, I'm talking about the pilot's G-tolerance and how the simulation should model blackout and redout.

Modeling G-load effects is a highly subjective process at best. We all know that 9g is

feel thirsty reduces a person's G-tolerance by an amazing 50%! In other words, a person normally capable of withstanding 8g would find themselves seriously challenged by a mere 4 to 5g under these circumstances. Further, G-tolerance varies with exposure to G-loads. The more G you pull on a regular basis, the more G your body can withstand. Having had the good fortune to personally

I didn't suffer any blackout symptoms but the sudden increase in my apparent weight seemed incredible. Had I stopped flying at exactly that moment, I would've walked away with the impression that 3g was virtually unbearable.

We didn't stop, however, and during the course of the engagement I reached 4.5g during combat maneuvering. Several times my

Tom "KC" Basham flying formation from the front seat of this T-34.

peripheral vision faded, replaced by a dull grey wall that lined the edge of my vision. At least twice I experienced rather severe tunnel vision. Most of my field of view turned grey and it appeared I was looking at the world through a paper towel tube. I'd give a strong grunt, squeezing my legs and abdomen, and my vision would immediately return. If I had stopped flying at that point, I would've walked away with the impression that 4.5g wasn't all that uncomfortable but was sufficient to seriously degrade vision.

Tweety and I had time left for one final merge. I was hot, thirsty, and somewhat tired from straining against the g-loads. We passed each other and one of the instructor's called "fight's on!" I banked the wings, pulled the stick, and watched with horror as my vision completely went away at only 2g! Everything was grey. I could see nothing. I was not, however, blacked out. On the contrary, I was quite awake and spoke with my instructor. "I can't see anything," I groaned.

"Well, if you can't see then you have to back off the g," my instructor replied. Yeah, well, either way I was destined to lose the fight at that point. If I pulled the necessary G to keep Tweety at bay I'd black out and com-

pletely lose consciousness. That was no good. If I kept up this level of G, I would remain conscious but blind while Tweety maneuvered into firing position. Backing off the G would give me my vision back but probably leave me a sitting duck. I backed off the stick, my vision returned *instantly*, and Tweety "shot" me seconds later. While I was wallowing around at 2g he had been saddling up.

Within the course of that one flight I observed that my personal G tolerance varied significantly. The more I pulled G, the easier it got until I became fatigued. During the next 3 flights I routinely reached 4.5g, each time becoming easier and easier to withstand. By my 4th flight, I reached 5g without experiencing any greyout and sustained 4.5g for quite some time also without any ill effects. During later flights in subsequent years, I found 5g easier and easier to withstand, and eventually begun to enjoy the feeling of 4g. I have sustained 4.5g and routinely reached 5g with little or no greying. During a 2 versus 1 fight where I was designated the "bandit" and tried to ambush the other two T-34s from above, I obtained sufficient velocity and briefly pulled 6g. I experienced significant, but not total, greying under 6g.

As you can see, my experiences under G-load varied greatly. Had I taken only one flight and then used that experience as a basis for a redout/blackout model in a flight sim, the simulation would've reflected the meager abilities of an inexperienced novice and not the significantly greater abilities of an experienced fighter pilot. Additionally, my flights were without the benefit of a G-suit. A G-suit fits over you legs and abdomen, inflating under G-load, providing the same effect as "straining" your lower body for you. Without one, I was forced to apply that pressure with my own muscles, ultimately increasing fatigue and eventually reducing G-tolerance (as illustrated by my total greyout on my very first flight).

Based on these experiences and subsequent conversations with fighter pilot friends, I became quite convinced that the redout/blackout models in most flight simulations, especially *Falcon 3.0's,* were quite off the mark, causing total loss of consciousness much too quickly. Having only been to +6g, my comments were often rebuked and not considered pertinent in the world of +8 to +9g. As fortune would have it, my day was coming.

At the end of August 1995, I was invited to SSI's VIP pavilion at the Miramar Air

Show. About to launch their new flight simulator, *Su-27,* they sponsored John Piggot's Su-29 aerobatic routine. Made by the same Sukhoi design bureau that builds the Su-27, the Su-29 is an amazing agile, prop-engined areobatic plane. With a roll rate in excess of 400 degrees-per-second, a structural limit of +13g, and enough engine to hang on the

exerted much effort straining against the G-load. I commented accordingly to Piggot who promptly corrected me; we had already reached 6.5g. I was quite amazed, 6.5g in the Su-29's reclined seat was *significantly* less strenuous than 4.5g sitting upright in the T-34. During subsequent maneuvers we reached 8.5g. Overall, I suffered no vision loss and

not be quantified due to the numerous variables mentioned earlier. Further, simulation pilots cannot "fight back" against G-loading by straining their lower body. Well, they *can* but it won't have any affect on the game. Under most circumstances, I do not favor flight simulations making assumptions about the pilot. For example, Electronic Arts assumes

A fine day for flying the skies over Atlanta.

prop like a hovering helicopter, the Su-29 puts on a good airshow routine. As part of SSI's sponsorship, I was privileged enough to get a demonstration ride. Although I didn't get any stick time, I did experience two full aileron rolls in something under two seconds. When Piggot initiated the roll I began counting, "one one thousand, two one thou...." and we had already completed both rolls. A truly amazing roll rate, far exceeding even that of an F-16!

During the course of events, we recorded -1.5g to +8.5g. Unlike my beloved T-34, the Su-29 uses a reclined seat similar to that of an F-16. I had read several times that reclined seats greatly improved G-tolerance but this was my first opportunity to verify such statements. Obviously concerned that I'd projectile vomit all over his cockpit, Piggot asked several times how I felt. I felt fine and, based on my previous experiences in the T-34, assumed we had pulled about 3 to 4g. I had experienced no greying nor had I

8.5g in the reclined seat felt less strenuous than 6g did in T-34. Only one event betrayed the full G-load we experienced: at 8.5g I could feel my cheeks sagging, much like Dan Akroyd and Chevy Chase in the movie *Spies Like Us.* An interesting sensation, to say the least.

At any rate, I now know for a fact that most simulations under estimate my personal G-tolerance, causing me to completely lose simulated consciousness too early. Kesmai's *Air Warrior* does a very good job of simulating fatigue from sustained G and the subsequent reduction in G-tolerance, although I still maintain that causes blackout about 1g too easily. *Falcon 3.05,* for example, tends to blast into blackout almost immediately after exceeding 8g. Even without the benefit of a G-suit, which an F-16 pilot would be wearing, I was able to withstand those kinds of G-loads longer than *Falcon 3.05* allows.

Representing G-tolerances in simulations is a highly subjective matter which can-

the player has the experience of a full-fledged fighter pilot and simplifies the avionics. I generally prefer fully detailed instrumentation which forces the player to *build* that experience level. In the case of G-loading, however, this doesn't seem to be an option. If the simulation does not assume the player has developed a robust G-tolerance, the player has no way of building that skill since there's no feedback from the computer chair to the PC.

Subsequently, I am of the firm opinion that simulations should assume "best case G-tolerance," allowing the pilot brief excursions to maximum G. Obviously, a P-51 pilot cannot sustain the same G-loads as an F-16 pilot due to cockpit anthropiometrics (as illustrated by my experiences in the T-34 and Su-29), but it would be nice if the game publishers gave us arm chair jet jocks a little more benefit of the doubt. - Lead is RTB.

★ OVER THERE ★

Air War In Japan:
A Raid to be Remembered

by Roy "Eric" Erickson, former Lt JG USNR

On Monday, March 19, 1945, LCDR Rawi explained the importance of the day's target: Kure Naval Base, located in Southern Kyushu, a few miles from Hiroshima. This was the largest Japanese Naval Base in their home islands — comparable to our Norfolk base in Virginia.

Our target: a group of oil storage tanks.

Up on topside, I climbed into my aircraft in total darkness. Once again, there were CIC reports of enemy war planes patrolling overhead. I got another very nervous plane captain

19 March...Strike on Japanese home islands

who reminded me of the reports. I couldn't help thinking of an article that had been recently published in *Life* Magazine; a full page photo showed downed B-24 pilots being beheaded in a town square by their Jap captors. That memory alone left me both angry and apprehensive as we departed for Japan.

This day we had three divisions, minus two planes that had problems, for a total of ten F4U-1D Corsairs. Three divisions of Hellcats from the *Yorktown* (CV-10) were also scheduled to join our group on this strike to the oil and airfields of the Kure base. The F6Fs apparently had a problem keeping

up with our F4Us as the CAG had many requests to "Hold it down!" The Corsair, even at moderate climbing and cruising speed, was apparently just too fast for the Hellcat. CDR John Hyland led our four-plane division; I flew wing on section leader Lt JG "Windy" Hill.

This was not to be a cohesive strike, and as we came in over the mountains of Japan our small force of ten aircraft was suddenly all alone. Passing over Shikoku Island, I wondered how so many planes could suddenly just disappear.

Matsuyama Air Base lay almost directly in the path to our target at Kure. Unknown to me, Matsuyama was the home of Air Group 343. CAPT Genda, CAG of Japanese air group 343, was monitoring our progress over the radio as we came in, trying to determine which targets our task force was going to attack. His squadrons, which had deployed the same time we were taking off, were already airborne.

At 0545 hours, two Nakajima C6N Myrts (single-engine carrier recon aircraft) took off. They flew south to search for our task force.

At 0650, the two Myrt recon planes reported, "Two American aircraft carriers, thirty miles south from Cape Ashizuri and groups of fighters and bombers coming up to the north!" The alert was given to scramble.

Air Group 343 was flying the new N1K2-J Shiden 21, code named "George." Unlike the Zero, the George had an automatic flap system that enabled it to turn on a dime. It also had self-sealing gas tanks, armor plate to protect the pilot, and two 20mm cannons in each wing. With a top speed of 369 mph at 18,370 feet, it was a formidable foe against the Corsair and the Hellcat. In the hands of a veteran pilot, the George was probably one of the best fighters to come out of Pacific Theater.

We crossed the mountains as dawn broke and arrived over the inlet at 12,000 feet. As we approached the target, I could see a group of eight Japanese planes circling 6,000 feet above us at eleven o'clock. Little did I, or any of us, realize they were part of Genda's 343 Air Group and were being led by Japanese ace, Lt Kanno of the 301 Squadron. In turn, each would execute a snap roll. Whether they were trying to draw us away from the target, were getting their courage up, or just plain showing off, I do not know. This was my first encounter with enemy fighters and, staring at the bright red meatballs on their wings and fuselages, it seemed as though I was watching a movie unreel before my eyes. We were indeed over Japan!

Ignoring them, CDR Hyland led us across the bay, made a 180-degree turn, then started our approach toward the oil storage tanks. As we dove from about 12,000 feet, we released our belly tanks and armed our bombs. Hill, my wingleader, was having problems, though, and couldn't jettison his

belly tank. Our 4-ship division began the attack and was followed closely by the other six Corsairs. Met with an absolutely ferocious barrage of antiaircraft fire, we dropped our bombs, fired our rockets, and strafed the target. We pulled out over the bay at about 3,000 feet to avoid small arms ground fire. Then a peculiar thing happened.

I spotted a Rufe float plane (a basic A6M Zeke with a float attachment) taking off ahead of us and informed CDR Hyland. Hyland went after (and ultimately downed) the Rufe while Hill and I started to climb. Hill was my wingleader and I stuck with him. Hill had lost sight of CDR Hyland and was subsequently attempting to join up with the first two-plane section he saw. For some reason, this division leader led us to the outer perimeter of the target area, away from the other aircraft in our group.

Suddenly, we were attacked from above by six Japanese fighters, which we thought were Zekes. Hill immediately initiated a "Thatch Weave" which he had used as a defensive maneuver many times in the previous years flying escort missions over Rabaul. The Thatch Weave involved crisscrossing back and forth so each section could protect the other from astern attack. As Hill and I reversed course, much to our dismay we observed the other section diving away at full power! We were left alone, holding the proverbial short end of the stick.

My three years of training were about to pay off! My aircraft and I were one. I kept a watchful eye on the circling enemy aircraft above us. As we continued to climb, two of the Zekes rolled and dove straight toward us. As they came within range, I pulled hard up into them and grayed out for a few seconds. Thank God I had my anti-blackout suit on. Without it I would have blacked out completely. My vision was clear when I put my gunsight directly on the lead plane and fired. The Jap pilots were flying such a tight section that I raked both planes with .50 caliber rounds. My plane shook as the tracers flowed, and I could see them sparkle against the silver-gray underbellies of the oncoming Zekes. As the last plane passed over me he was already in flames, trailing thick black smoke. He was so close I could count the rivets in his wings. Hill was below me and wasn't able to confirm my kill, but, being out of formation, I wisely decided to form on Hill
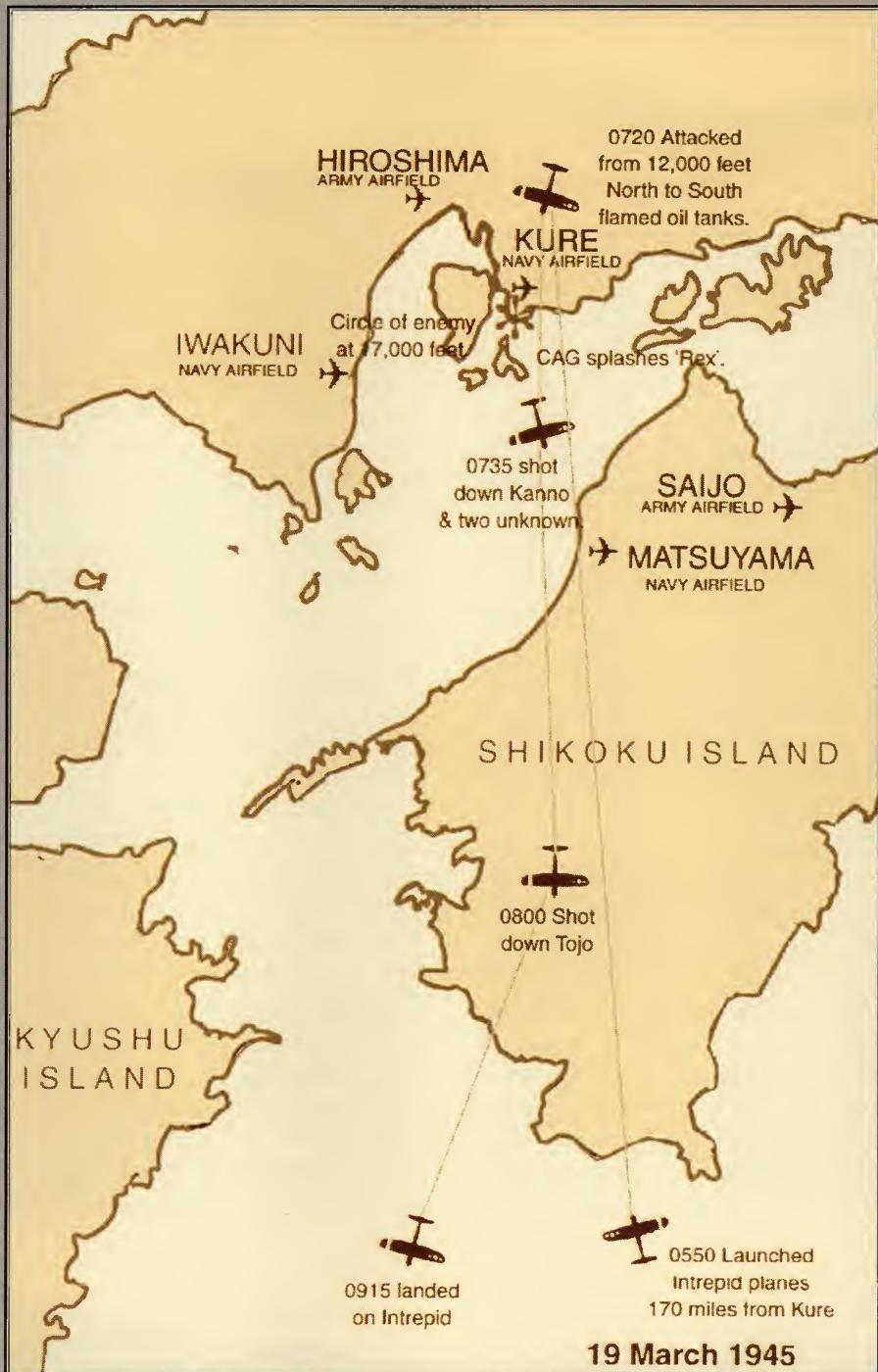
Map of Japan showing our division's route.

and not follow the plane that I'd lit up.

Making a turn to join up, I saw another Zeke sitting on Hill's tail, guns flashing away! We started our weave, and Hill shouted, "Shoot the son-of-a-bitch, Eric, shoot the son-of-a-bitch!" By now we were well into our first weave and I answered, "What the hell do you think I'm trying to do?"

My first efforts to get the Zeke in my sights were fruitless and I quickly realized we were weaving too tight. On the second weave I went out far enough to make damn sure I

had him sighted. All this time he had been hammering at Hill, and I'm sure my partner's drawers were a bit moist. The Zeke suddenly broke away to Hill's left and flew directly in front of me! I could see Hill off to the right, still zigging and zagging, seemingly unaware that his pursuer had turned away. In a matter of seconds I had the unwary Jap pilot perfectly bracketed in my sights and then, with all my six guns blazing, the Zeke blew apart! The front section of his plane flew on straight and level, but the tail piece sheared off behind the
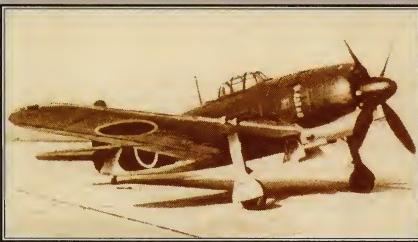
Shiden - Kai N1K2 - J George

cockpit and spun crazily away. Gaining on him fast, I flew through all kinds of flaming debris, instinctively ducking to avoid getting hit by all the fragments. There was no sign of anyone even trying to jump out of the enemy plane, so I assumed the pilot was dead. The time it took to make that assumption was all the thought I gave it.

I was now high above and in front of Hill and I made a turn to join up on him. To my amazement he was already shooting at another Zeke! I watched as his quarry burst into flame and the pilot scrambled out. As his chute billowed, I tried to get my sights on him, but to no avail. (Later, I heard this practice may not be such a good tactic, as it didn't help the treatment given to our POWs below.

Years later, we learned that Hill had downed Japanese ace LT Kanno, leader of 301 Squadron from Air Group 343! Kanno landed roughly on a farm field, suffering burns to his face and hands. Eager to report in, Kanno quickly located a bicycle and returned to Matsuyama Airfield. Kanno returned to duty but was killed in August 1945 during an attack on two B-24s. Further, we eventually learned that the fighters weren't

Zekes at all, but the potent Georges!

We rejoined and headed out to sea. Cruising back over Shikoku Island, I looked over at Hill, who had positioned me a hundred yards to the side of him. I couldn't believe my eyes! What appeared to be a Ki-44 Tojo sat on Hill's tail with all four cannons blasting away! I shouted a warning to Windy and we immediately broke to weave, but I couldn't get the proper lead on the enemy. Not wanting to waste ammo, I didn't fire. Having learned my lessons well the first time around, I went further out in the weave than seemed necessary. Coming back on the second weave, I had a straight 90-degree deflection shot. To get the necessary lead angle on the Tojo, I had to point my sights directly at Hill's head. It took real nerves of steel to pull the trigger, but true to my training the tracers seemed to bend directly into the Tojo! He went ablaze and slid to the earth. That was my *third* victory of the day! Again, I learned afterwards that this Tojo was in actuality another George!

Finally reaching open sea, I felt fairly safe. Unfortunately, looking into the rear view mirror I spotted eight dots in the distance definitely chasing us! Down to 500 feet, we approached one of the task force's picket destroyers. Hill tuned to their radio frequency and called, "Two friendly aircraft are heading your way! Let them go by but shoot those eight bastards chasing them!" Due to the drag from Hill's stuck belly tank, we were moving slowly and the dots were gaining on us. About the time the eight bandits opened fire

Roy "Eric" Erickson commenced US Navy flight training in 1942 and deployed with VBF-10 to the PTO in 1945. A young ensign flying F4U Corsairs from the USS *Intrepid*, Erickson scored three air-to-air kills, participated in the airstrikes which ultimately sank the Japanese battleship *Yamato*, and endured Kamikaze attacks while onboard the *Intrepid*. Years later, Erickson has managed to track down Japanese records regarding his combat sorties. His limited edition book, "Tail End Charlies," follows the story of US Navy combat pilots through their three-year training program and combat deployment to the PTO in the war's final months.

on us, Hill realized they were *also* Corsairs and shouted over the radio, "Quit shooting as us you SOBs, we're friendly!"

The Corsairs obliged and broke away, but the confused destroyer was transmitting, "*Who* did you say to shoot?"

Hill promptly replied, "Don't shoot anybody, it's all a mistake." We could see the destroyer's guns tracking us as we passed by, however. Hill made it a point to stay low, slow, and not make any sudden course changes until we were out of their sight!

Back on board the *Intrepid*, the fog of war set in and Hill and I argued about the exact sequence of the day's events. Eventually, we agreed to share one of the kills. In the end, the Japanese Navy's 343 Air Group claimed 57 victories for 16 losses, including 53 Corsairs and Hellcats even though we'd fielded only 22 of those aircraft types! Our task group claimed 51 victories for 13 losses, most of which fell to antiaircraft fire.

Kure Harbor, 19 March 1945.

Touring Europe with
Across the Rhine

by Ed Dille & Brian Workman

Are you still bogged down in the hedgerows of France? Does the throaty sound of a Panther's diesels cause you to wake up in a cold sweat? Or perhaps you've already taken that million dollar wound and are on your way back to the real world? If any of these situa-

Although infantry and armor will face the brunt of the fighting, they require the assistance of support units in order to retain viable formations across multiple engagements. Artillery and air cover provide fire support for infantry and tanks, both on the offensive and

other terrain where spotting becomes difficult at longer ranges, so that his units can hide until their shorter range weapons can be effective. In real life, the response to this placement in the woods might be to use artillery. Artillery can be devastating to infantry in the woods, because of the splintering of the wood of the trees that is caused by the impact of the shots. So, as you can see, by trying to defend against one type of offense, the unit made itself very vulnerable to another type. This illustrates the concept of combined arms.

The implications of improper tactics are obvious.

tions describe you, then chances are that you have been playing Microprose's *Across the Rhine*...and you have found yourself very alone behind enemy lines. Allow the Aces to extract you from this predicament by providing some desperately needed guidance on the internal workings of this engine and some sound strategic background.

World War II was the first modern, mechanized war. Successfully conducting such a war requires the coordination of many troop types.

defensive. This is known as the concept of *combined arms*. To succeed in command, you must use combined arms to advantage while making sure that the enemy can not.

The concept of combined arms is one of weakness, or the exploitation of a weakness that arises from an enemy's reaction to one of your strengths. For example, if the enemy's force consists mainly of infantry and yours of tanks, the enemy, to even the odds somewhat, can place his units in woods or in

Not enough can *ever* be said to cover the benefits of the proper use of artillery in *Across the Rhine*. This type of unit is capable of extremely long-range indirect-fire attacks on any position on the map screen. It does not require line of sight to the target and therefore can be employed not only on known enemy positions, but on suspected positions. It will attack all units in its sphere of influence equally, enemy and friendly, within a diameter of approximately one third of a kilometer. This is a large area which represents the firing of an entire battery of artillery. Further, one call for fire provides four barrages in the designated impact zone. Finally, each piece of artillery you're given in a scenario can be used three times. As such, in a scenario where you have two batteries of artillery; this adds up to a total of 24 attacks that can be given on up to six points of call. If properly placed, these attacks can be so devastating that you can break enemy Companies with artillery only and prevent them from even entering the battle against your forces.

The only drawback is that artillery requires downtime for restocking of ammo and readjustment of the weapon for its next target. You need to adjust to this downtime;

once you gain experience in the game, you learn when to use the artillery and when to save it for use at a later time. Spotting has a definite effect on the point of impact of the rounds. If you have a friendly unit with line of sight to the point of call for the artillery attack, it tends to land closer. This is very realistic and imitates the adjustments made to the point of impact by spotters in real life.

Reconnaissance aircraft are used to move slowly around the battlefield and locate enemy positions and troop dispositions. In *Across the Rhine,* they spot enemy units for you only as long as they're on the battlefield map. Therefore, these aircraft are probably best used to locate units by giving them waypoints that cause them to move back and forth from one end of the map to the other, up and down in the enemies' territory. This will cause the aircraft to remain on the map as long as possible and give you the full benefit of their use.

Close-support aircraft, unlike artillery, can be called in on a target that has not been spotted by a friendly unit without effect on its attack. Upon arrival at the point of call, the air-

The German Panthers are particularly deadly.

A Sherman rolls east to link up with airborne forces, whose glider can be seen in the background. (Imperial War Museum)

craft will search, within reason, for a target. This target could be friendly or enemy, which indicates the difficulty of identifying the nationality of a target at low altitudes and high rates of speed. The aircraft will then attack the five targets that are the closest to the point of call, with a preference for armored units when it can find them.

AI Anomalies Revealed

Your major advantage over the computer AI opponent is that the latter does not

coordinate units at the battalion level. When you're spotted by an enemy unit, that unit alerts other members of its parent company, and that company will react to you cohesively, but other companies within its battalion are not alerted to your presence. Therefore, the AI opponent is severely limited in its ability to change its pre-defined orders and does not move companies to counter an attack in which you've gained a *local* advantage, via either superior forces or position. Another way this becomes apparent is in a Counterattack-type Battle. While on the defensive, the reserve units controlled by the AI are preplotted and can't be changed. Therefore, by choosing a point of attack other

than the most likely one, you can virtually ensure that the *mobile* reserves end up out of position for countering your strategy.

Another advantage you have is that the game database always plays on the Limited Intelligence option. So it only knows where your units are when they are actually sighted by an enemy unit. This gives you a tremendous advantage when playing on the Partial or the Full Intelligence option. When you are good enough, by all means go with the Limited Intelligence option. It is more realistic and you get more points because the difficulty is higher. But, if you are having trouble learning the game, this is a good way of gaining a temporary advantage to learn how the computer deploys and moves its troops.

Before the Battle

There are a couple of ways to increase your firepower at the company level of command. One is to transfer units from other companies to your company on the Battalion Organization screen during the Battle Briefing. Be careful when you do this, because you can sometimes lower your company's stats this way. You must also consider the gaps you leave in the company the unit was removed from and the associated reduction of that company's attack strength. The second method is to detach units from companies and give them orders of their own after the battle starts. Also, once the battle starts, you will also find that the computer hasn't always

One of the best fighters of the war.

given your Companies optimum movement orders. So once you enter battle, check all of your Companies' orders and correct those that don't fit your battle strategy. Unfortunately the game doesn't give you this capability before entering battle.

Combat by the Numbers

The combat system is designed and operates on the platoon level. It is a complex interaction between the various combatants,

their weapon systems, ammo loadouts, grade, and the overall battle situation. There are a number of complex formulae that determine target selection and the actual combat results. Following are the explanations for these formulae and how they interact in the game.

Once a target is visible, a platoon or section determines if it is able to damage the target. This determination is made by assessing the range, ammo, and combat strength of the target. If multiple targets are present, the

platoon must determine the optimum target, which is the one capable of inflicting the most damage *given all the factors* to the unit making the evaluation. The platoon evaluates all the possible targets through an algorithm. Any enemy platoons that cannot be damaged are eliminated. All that can be damaged, but can not damage the friendly platoon are given the lowest priority. The units that can be damaged by the friendly platoon and can in turn damage the friendly platoon at short range are given the highest priority, followed by medium, and then long range. The same evaluation is true for those units the friendly platoon can damage. More weight is placed on the enemy unit's ability to damage the friendly unit than vice versa. Generally speaking, friendly platoons engage units that can hurt them a great deal before engaging units they can hurt a great deal. In situations where no enemy units that can damage the friendly platoon are in range, or the friendly platoon can not damage the enemy platoon that can damage it, the friendly platoon defaults to engage the target it can damage the greatest.

The amount of damage you can do to an enemy platoon is again a complicated formula. First the particular platoon's firing strength against the target type is taken and modified for range, ammo, losses, and unit grade. The range modifier is basically set so that at long range your attack strength is reduced, at medium range it is normal, and at short range it is increased. The grade modifier is standardized at the Regulars level. It lowers the attack strength at the Green troop level and the maximum increase of approximately 30% comes at the Elite troop level. Next, the type of ammo being used is figured into the result. Is it the right ammo for the job (for example, HVAP rounds affect enemy tanks the best while HE affects infantry the best). And finally, the actual attack strength of the platoon is reduced by the number of losses it has sustained previously, if any. For example, if a platoon normally has five tanks in it and one is already knocked out or broken down, the attack strength factor would be reduced by 20%.

The defense factor of a platoon takes into account platoon losses, terrain, and flank that the attack is coming from. The defense strength of each unit is higher when a unit is attacked in the front than it is on the sides or rear. This is true to life and most military

vehicles have thicker armor on the front, the thought being that you will always face your enemy. Unfortunately this isn't always true. The modifier for platoon losses is the same for attacking strength and finally the modifier for terrain is thrown in. A platoon gets approximately a 30% increase in defense strength for being adjacent to woods or a city. This is because they are harder to pick out from the terrain and could be partially hidden. This effect can be cumulative so choose your defensive terrain carefully.

The combat system compares the friendly platoon's attack factor with the target platoon's defense factor. Random numbers

overall status of the factors that make up a company's Cohesion. Morale is described as being Superb, Outstanding, Satisfactory, Fair, or Poor, respectively. With this information, you can gauge each company's combat stability. The descriptive Morale terms represent the numerical value of Morale in the game. Keep in mind that Morale is a totally different concept than the company's Grade. While Grade is a measure of skill or training, Morale is a measure of the relative stability in the face of the enemy. The player is continually advised of each company's current Morale, Grade, and State of Readiness. This information is listed with the company's name identifier.

trying to eliminate the enemies' HQ unit whenever possible. The loss of an HQ unit has double the effect towards the Company reaching its Cohesion Point and possibly breaking. The Break Point is a representation of the probability of a company breaking after it reaches its Cohesion Point. Breaking is not automatic. Some units will have a greater chance of breaking than other units. Once a unit breaks, it automatically withdraws from the battlefield in an attempt to save itself. Another effect of losing the HQ unit is that the units of that command no longer follow orders completely or all of the time. This is especial-

A 'Duck' takes to the water. This legendary amphibian was the main US infantry carrier used for the Rhine crossing. Hundreds of these , in constant use, hastened the buildup on the east bank.   (Imperial War Museum)

are generated and a comparative result determines if none, one, two or more units are knocked out. Platoons take losses in individual units, with the latter being equivalent to a single tank, squad or similar level of organization and equipage. A unit is either knocked out or it is unaffected by combat; there is no damage to an individual unit. The magnitude of the smoke on the two dimensional map indicates the degree of losses the platoon has taken, which may also be thought of as how many units of the total platoon have been knocked out. This smoke has no effect on sighting. That is enough on combat and probably more than most of you want.

Morale and Combat Readiness

One of the most important aspects of the game is Morale and its relation to the Cohesion Point and Break Point of the Companies. Morale in the game is a descriptive term used to convey to the player the

There are two key elements that make up the Morale System in Across the Rhine— the Cohesion Point and the Break Point. These two dynamic elements control the behavior of each company. The Cohesion Point should be thought of as a trigger point. Until it is reached, the unit functions normally in all respects. After the Cohesion Point is reached, the unit is subject to "breaking" with each additional loss of a combat unit.

A number of elements are used to calculate the Cohesion Point. Most are variable elements with the exception of the Nationality factor; this remains constant. The other elements vary as the unit engages in combat, rests, and gains experience. But the main one of concern to the player is the Company effective point total. This is figured by giving a value of one to all units in the Company except for the *original* HQ unit. The HQ unit is given a value of two. This should show the importance of protecting your HQ unit and of

Slow but sure. A raft is used to ferry across armor, one at a time.   **(US Army)**

keep you alive and in the campaign. After all, isn't staying in the fight what it is all about?

The game varies greatly in intensity, with the Battle Builder scenarios usually being the easiest and then running through the Historical Campaign to the Hypothetical Campaign. The chart below shows and rates the Historical Campaign for Intensity (chance of battle on any given day) by the Division chosen for play.

Division/Track Intensity

German PZ Lehr Division	35.5%
U.S. 10th Armored	27.6%
German 11th PZ Division	27.4%
German 116th PZ Division	26.5%
U.S. 4th Armored	24.8%

ly true in the case of the loss of the Battalion command unit.

Some final points of interest:

The 3-D mode of the game is nice to get your bearings in the local area, but you *must not* attempt to fight your battles from this view. The range of the enemy units are such that they will attack and destroy you long before you can ever visually acquire them in the 3-D view. As such, this highly awaited component of the game has been reduced to little more than window dressing.

Scoring for the game is determined by the number of enemy units destroyed (by point value) and objectives taken (or lost if on the defensive). The objective point value equals 25 percent of the total point value of you and the opposing forces. This number is then divided equally between the number of objectives. In a Delaying Action, the objective point value is equal to the attacking force's point total. The Reality switches with the exception of Rank control also affect scoring.

There are two ways to lose your character. Upon completion of the campaign tracks, your character is retired, this is permanent. Once retired, your character can't be put back into the game unless he's erased from the player roster and you start over. If you'd like to continue with a character you have to exit from the campaign track before the end (March, 1945). If you discover your character has been killed you can avoid this by replaying the battle. It will give you a Phoenix award in your medal case but it will
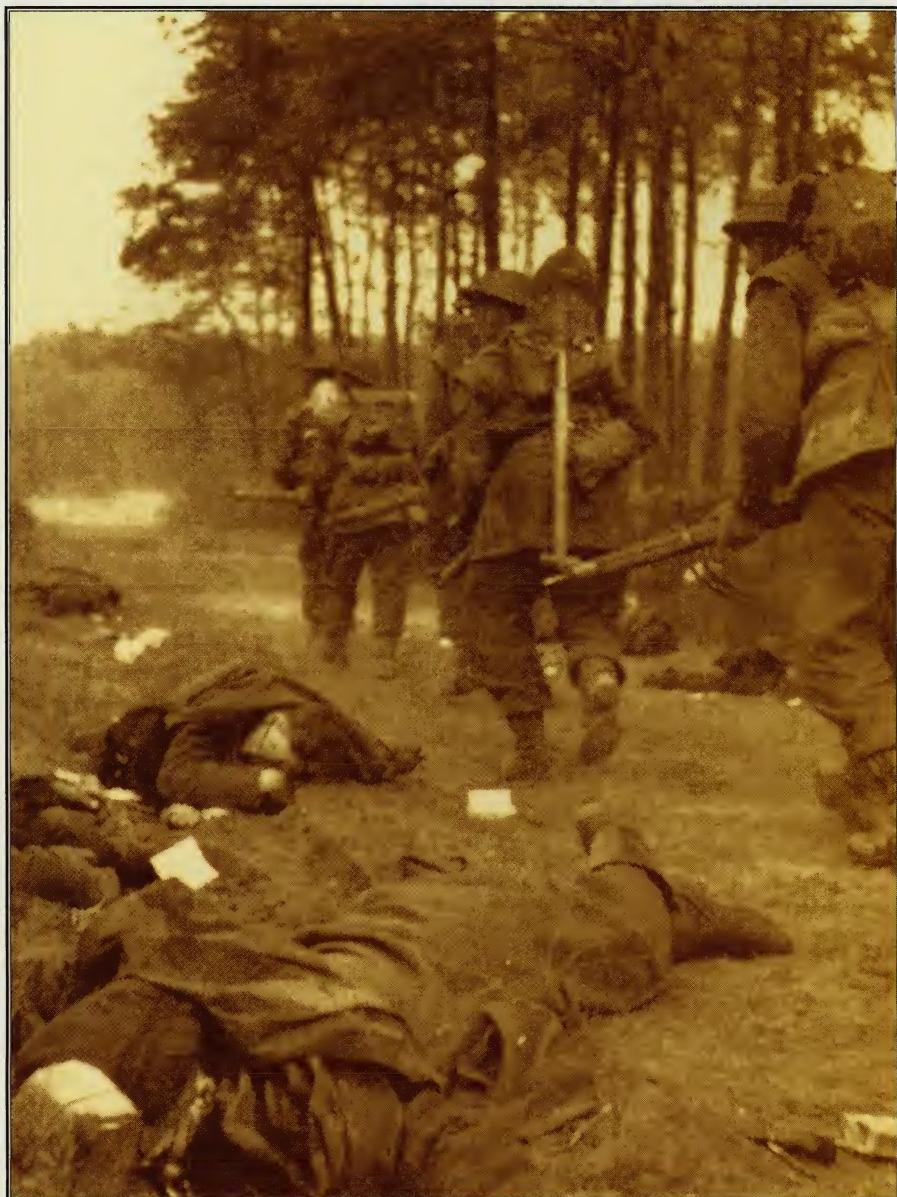
British troops pass the results of their handiwork as they push deeper into Germany.   **(Imperial War Museum)**

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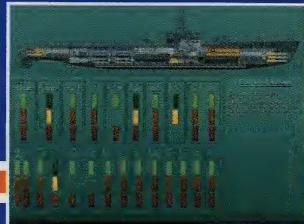
Aircraft Rundown: World War 2 Aircraft

by Tom "KC" Basham

With the ever increasing popularity of World War II flight sims for on-line, network, head-to-head and stand alone play, we're starting a series on WW II aircraft designed to give the readers some insight into flying and fighting these wonderful machines whom many regard as the ultimate piston-powered, single-engine aircraft. This month we will discuss three of the better known allied aircraft: The P-51 Mustang, the F4U Corsair, and the P-47 Thunderbolt. All three aircraft played a major role in the air war, and all three remain popular as an increasing number of sim pilots battle for the skies in WW II.

Say, "World War II fighter," and most people will conjure up a vision of the P-51D. Certainly one of the prettiest aircraft ever built, it's sleek lines reminiscent of a shark on the prowl for dinner, it looks fast even when sitting on the ramp. It's good looks don't belie it's strongest asset either, this airplane *is* fast!

It carried enough fuel to escort bombers into the heart of Germany and back home to England. The presence of these "little friends" was a source of comfort to the bomber crews who previously had to depend on their defensive box formation for protection from marauding enemy fighters. North American Aircraft's premier fighter may not have won the air war single handed, but it was a tool that let the craftsmen who flew them range far and wide in search of enemy targets, both on the ground and in the air, with great success.

The major strength of the "Pony" is obvious to all who see one. The sheer speed of this bird serves as both a defensive and offensive weapon. As long as the Mustang pilot keeps the speed up and doesn't attempt to "stall fight" he will probably live to fight another day. While different sims model the characteristics of all aircraft differently, and some do allow simulated Mustangs to do

things not possible in the real aircraft, most do present the Mustang as fast, maneuverable, and responsive to control inputs. Keeping the "E" (energy) up is requisite to being successful in the P-51. The hit and run technique, commonly called "boom and zoom," is a tailor made fighting method for this platform. Pilots flying the Mustang need to use altitude, speed, and position to pounce on unsuspecting prey and exit the area as rapidly as possible once the attack is made. The aircraft offers great visibility, allowing the pilot to maintain peak situational awareness. Due to the 'Stang's relatively poor low speed turning performance, hanging around for a knife fight is usually ill advised. As with all things in aviation, and life, planning ahead to exploit the strength of this great warbird will pay dividends for the pilots.

The Chance-Vought designed F4U Corsair is another fighter with a very distinc-

The F4U Corsair

tive appearance. Its inverted gull-wing (required to allow adequate ground clearance for the huge, 13' propeller), and its long, round nose (which houses the 2000 hp Pratt & Whitney radial engine) earned the F4U its most popular nicknames: "Hose Nose" and "bent wing bird." The oil coolers mounted in the wings "whistled" at high speed and many enemy soldiers called the F4U "whistling death." Sporting either six .50 caliber machine guns or four 20 mm cannons mounted in the wings the Corsair was a tough and deadly adversary during the long war in the Pacific. Soon after it's introduction, the "bent wing bird" and the pilots that flew them established in everyone's mind this weapons package was superior to that of the much vaunted Zero. Due to the fact the F4U is in its element at the same altitude the long range bombers flew (about 30,000 feet), the F4U pilots often caught the brunt of Japanese attacks on the bomber formations. With the P-40s below and P-38s flying top cover, the attacking aircraft heading straight for the bombers found old "hose nose" more than a match in this contest.

While not quite as fast as the P-51D, the F4U shares the same strengths and weaknesses. Boomin' and zoomin' are the order of the day, especially in those sims which accurately model the Corsair's poor turning performance. The real aircraft was tough and durable, but getting caught up in a turning fight with the nimble Zero often had severe consequences. The view from this aircraft isn't quite as good as from other aircraft, and some of the sims do model the reduced visibility in the 6 o'clock area. The unique wing design and placement of the cockpit relatively far aft does offer better visibility around the wings compared to some of the F4U's contemporaries. The Corsair is a hardy mount that's fast enough to get you out of trouble if you manage your altitude and airspeed carefully. Never let yourself get too low or too slow when bad guys are about. A high speed pass from the target's high six o'clock position is an ideal engagement practice for your virtual Corsair. The speed of the "hog" coupled with good handling qualities at speed gives you an advantage as long as you practice good energy management.

The P-47 Thunderbolt is not the prettiest aircraft to ever grace the skies, at least I've

The P-51 Mustang

never heard that argument made. Unfortunately for us all, I've never encountered a sim that accurately represents the Jug's attributes. The P-47, epitomized by the -D model, is truly at home at high altitude. The designers put in an engine large enough to get the job done on bomber escort assignments, built an airframe tough enough to take a pounding and still get the pilot home, and carry enough bombs and fuel to take the war to the enemy. After the longer range Mustang arrived on the scene the Thunderbolt moved to a ground attack role where it served with distinction.

It's been my experience that many of the strengths of the Jug, particularly the ability to absorb punishment, has been over looked by the flight sim designers. The simulated bird often is not as maneuverable as the wartime versions are reported to have been, they seem under powered, more prone to control system lockups due to compressibility, and lack the ability to climb rapidly to high altitude. While the real thing wasn't as agile as many fighters of the day, the P-47 did have it's moments. Some online pilots

do fly the Jug with great success, but if *Air Warrior's* flight model recreated what this bird was really capable of doing it would be a more popular craft.

Success in aerial combat depends on a number of factors. The war for the skies in World War II was won by a combination of man and machine not seen before or since. The successful pilots had a lot attributes that can be measured; eyesight, good motor skills, intelligence, courage, and stamina, just to name a few. We all can enhance our own virtual flying and fighting abilities by emulating one important characteristic all WW II pilots shared—know the equipment! The old pilots adage "Plan your flight and fly your plan" applies for those of us flying the virtual skies too. We can modifiy the phrase to "Plan your fight and fight your plan". If you exploit the strength of your aircraft while not exposing the weakness inherent in all of them, you will find your combat career more rewarding. As a bonus, you won't be considered a "dweeb" when you report for duty in your online squadron or network sortie!

Why Doesn't My Joystick Work?

by Tom "KC" Basham

Ever load a new game onto your computer and find your joystick won't work properly? Ever get erratic response from a joystick? Ever experience joystick drift? If the answer to any of these questions was yes, what happened? Was the software at fault? The computer? The joystick? How do you know? Hopefully after reading this you'll not only know what went wrong, but understand why as well as how to fix the problem. The following text, which Buzz Hoffman and Bob Church of Thrustmaster, Inc. helped compile, examines how a game port on an IBM-compatible PC works, how software interfaces with the port, where problems develop, and why.

If The Clock Is Flashing, There Has Been A Power Outage

A standard game card provides two joystick ports using either one or two physical 15-pin connectors. Each joystick port has two analog axes, "x" and "y," and two open/close button inputs for a total of four analog axes and four button inputs. Some game cards provide a separate connector for each joystick port, but most provide both ports with a single connector. The Thrustmaster *ACM* card, for example, provides *four* joystick inputs with two connectors. Consult your game card's manual if you are unsure how many joystick ports your card supplies.

So, how does the joystick actually work? Button inputs are simple: the input is held high at +5 volts when the switch is open. Switch closure pulls the line low to 0 volts. The game card monitors the input voltages of the button inputs and reports the status (open or close) accordingly.

Meanwhile, each analog axis is connected to a variable resistor called a *potentiometer,* or *pot,* inside the joystick. Moving the joystick changes the value of each associated pot. Each pot connects to a *timer circuit* onboard the game card. A timer circuit produces a variable-duration pulse after receiving some form of trigger. The duration of the output pulse wave is determined by the resistance and capacitance values connected to the timer circuit. Changing the resistance and capacitance values connected to the timer circuit changes the duration of the output pulse. The game card provides the necessary capacitance; the joystick provides the

Typical hook up as illustrated in the ThrustMaster TQS and FLCS manuels.

necessary resistance values. Moving the joystick changes the resistance values and subsequently changes the duration of the timer circuit's output pulse.

So, the game card reports whether a joystick button is open or closed based on the input voltage from the button and generates variable length pulses based on moving the joystick. How does the rest of the PC know what is going on? Glad you asked.

Recording One Program While Watching A Different Channel

Everything in a PC has an *address.* In very simple terms, an address is much like a phone number. When a program needs to access some device, like a game port, it essentially *calls the device's phone number.*

Multiple devices cannot share the exact same address; imagine two houses having an identical area code and phone number. Which phone would ring when you dialed the number? If two devices share the same address, both will try to answer when that address is accessed, resulting in a *device conflict.* Generally, you cannot have two separate game cards in the same machine since both would share the same address and would try to "talk" at the same time. This is the first problem you could encounter, and can be resolved only *by disabling one of the game cards.*

So, what exactly happens when the PC calls the game card's address? Whenever the game port's address is read, it places a single byte of data on the PC's data bus. The four high order bits represent the four joystick buttons with "1" meaning the button is open and "0" meaning the button is closed (i.e., the button is pushed). The four low order bits each represent one of the four timer outputs where a "1" means the timer circuit associated with that axis is generating a pulse, and a "0" means it is awaiting a trigger. Now, hold on to that information for a moment while we examine what the software is doing.

The process begins when the software, such as *Falcon 3.0,* "calls" the game card. The software begins by writing to that address (usually 201hex). Remember earlier we explained that the timer circuit requires a trigger before generating an output pulse. This write operation provides that trigger. Now life gets busy as we enter the *timer cycle.* The timer circuits all generate output pulses, the duration of which depend on the position of the joysticks. While each pulse lasts, the aforementioned bit representing that axis is set to "1," when the pulse ceases the bit is reset to "0." The software, meanwhile, starts a

times adjusting internal scaling constants based on CPU clock speed.

Very fast machines with very slow game cards can suffer a more obscure software problem. With a fast machine, it's possible for the routine to write the trigger to the game port then come back and read the port before the game card can set the data bits high. In this case, the software sees the axis bit still set to 0, thinks the timer cycle is over, and returns a value of zero in the counter. Returning a zero in the counter may lead the program to think the stick is disconnected completely. If the problem occurs during calibration, all subsequent joystick calculations will be erroneous. Multi-IO cards experience this problem more than the dedicated game cards because there is usually another tier of selection logic involved between the timer circuit and the system bus. Although this is a limitation of the game hardware, the burden is on the software to account for this situation. Why? Machines are getting faster and faster and solving this type of timing contention with game card hardware gets expensive. High speed components have high price tags attached. Software-wise, though, the problem is relatively easily avoided by inserting a delay before the first read or by waiting for the timer bit to go high before the counting loop is started. It is necessary to put some limit on how long the routine will wait, though, in case the port does not generate a pulse at all for some odd reason.

The next type of software problem occurs when the software tries to trigger a timer while the timer is already active. This occurs most often when the program is not reading all four axes at once. The single write operation triggers all four timers and each timer cannot be "re triggered" until it has completed its timer cycle. If the program tries to read another axis before the first timer cycle completes it'll wind up measuring the remainder of the previous pulse, not the duration of a complete pulse. This problem can be avoided by reading all four axes simultaneously, or at least making sure the bit representing that axis cycles from "0" to "1" (indicating the start of a timer cycle) before starting the counter loop.

If you encounter a software problem there's little you can do except slow down your computer (not always a viable solution), beg the game publisher to provide a patch (not

likely on older products) or use an adjustable-speed game card (discussed next).

Should I Buy An Adjustable Game Card?

The high-end "adjustable" game cards help with most of the aforementioned software situations. Just what exactly do they "adjust?" They let you tweak timer cycles by adjusting the overall resistance in the timer circuits. The adjustable cards add an additional pot in series with, or in line with, the joystick. For example, a 1 to 100KW adjustment pot on the adjustable game card would be put in series with a typical 1 to 100KW joystick pot. With the adjustment pot at minimum, the joystick varies circuit resistance from 2W to 101KW, and with the adjustment pot at maximum, the joystick varies circuit resistance from 101KW to 201KW. The duration the timer circuit's output pulse is still proportional to the stick deflection, but the actual duration of the pulse varies with the resistance changes. By shortening the length of the pulses, older programs will no longer time out when run on faster machines.

This adjustment is frequently and inaccurately called a *sensitivity adjustment*. Most games use calibration routines to obtain maximum range values and compare later stick reads to these stored maximums. Despite the individual length of the pulses at any given adjustment setting they are still proportional to the maximum values derived during the calibration. Very few programs do not use any kind of calibration so very few programs actually see a sensitivity change. Tweaking the adjustment pot *after* the completing calibration alters the proportional relationship, though, producing unpredictable results.

Overall, *there are no joystick problems that an adjustable game card fixes that can't be fixed through software,* although some software problems can be so severe that *no adjustable game card can overcome them.* Armed with a high-quality components and well-written software, there is no need for an adjustable game card. An adjustable card may solve your problems if it uses higher-quality components than your current game card, or if you're using older software on a newer, faster machine.

All Systems Nominal

If you're having joystick problems, first verify that you have only one game card

active in your system. Joystick connectors are always 15-pin connectors. A single card may have either one or two, but you should not have any 15 pin joystick connectors (called DB15 connectors) anywhere else in the system. If you do, one set *must* be disabled. Thrustmaster reports that nearly 50% of all joystick complaint calls they receive are eventually traced to multiple active game ports. Multiple game cards may work peacefully together for a while, but are bound to cause problems eventually.

Next, try running a joystick diagnostic program that shows the state of all four buttons and some analog representation of the stick movement, such as Thrustmaster's *tmsa* program or some calibration routines in some games. These diagnostics show you values returned from their own counter loops as you move the stick around, either graphically or by displaying the raw numbers. By analyzing the output you can see erratic travel (probably caused by the joystick), or limited travel to one direction (probably caused by pot rotation). Most joystick diagnostic programs are written to avoid the software problems described above and allow you to focus on your hardware only.

You can check the card for thermal drift by starting the offending program immediately after starting your machine, while your computer is still cold. Leave the stick someplace where it won't see big temperature variations and won't get moved. Watch the values for 15 or 20 minutes while the machine warms up and see if there's much change in the values. If there is, then you probably need a better game card.

While you're running the tests, you should also be watching for erratic value changes as you move the controls. The values should change relatively smoothly with stick movement. If they jump around, or you get dead spots, you may have a bad pot in the joystick or you may have multiple game ports active and conflicting.

If everything looks reasonable, responsive, and smooth then you probably don't have a hardware problem. Generally, if the joystick works with any one game but not with another, then there's nothing really wrong with the hardware and you're seeing some kind of software problem. If the test program can get reasonably sane values from your hardware, all other software can too.

PC ACE
Readers Survey

NAME_____

ADDRESS_____

CITY, STATE_____

ZIP CODE_____

TELEPHONE (   )_____

1: What is your age?

A. Under 11

B. 12-18

C. 19-24

D. 25-34

E. 35-49

F. Over 50

2: What is your sex?

A. Female

B. Male

3: What type of computer do you use?

A. IBM/Compatible

B. Macintosh

C. Amiga

D. Atari

E. Commodore

F. Apple (Non-Mac)

G. Tandy/Radio Shack
         (Non IBM)

4: What is the clock speed of your computer?

A. 33 Mhz

B. 50 Mhz

C. 44 Mhz

D. 70 Mhz

E. 100 Mhz

5. How do you get access to the internet?

A. America Online

B. Compuserve

C. Prodigy

D. School

E. Private internet
         provider
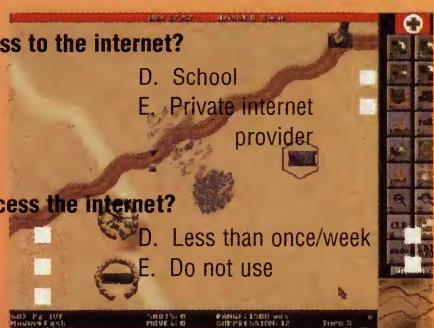
6: How often do you access the internet?

A. Daily

B. Couple of times/week

C. Once a week

D. Less than once/week

E. Do not use

7: Which of the following accessories do you currently own?

A. Graphics board

B. Internal/External Modem

C. SVGA Monitor

D. Sound board

F. Joystick

G. CD-ROM drive

H. After market speakers

8: Which of the following accessories do you plan to purchase in the next 12 months?

A. Graphics board

B. Internal/External Modem

C. SVGA Monitor

D. Sound board

F. Joystick

G. CD-ROM drive

H. After market speakers

9: Where do you purchase your software?

A. Electronics Store

B. Record Store

C. Video Store

D. Toy Store

E. Mail order

F. Department Store

G. Other_____

10: How much do you spend on software annually?

A. $0-$250

B. $251-$500

C. $501-$750

D. $751-$1,000

E. $1,001-$1,500

F. $1,501-$2,000

11: How many people read your copy of PCAce?

A. 1

B. 2-3

C. 4-6

D. 7-8

E. 9 or more

12: What is your current marital status?

A. Married

B. Single, never married

C. Widowed

D. Separated/Divorced

13: Do you have children?

A. Yes

B. No

14: If Yes, how many?

A. 1

B. 2

C. 3

D. 4 or more

15: How old are your children?

A. 1-5

B. 6-10

C. 11-16

D. 17 or over

16: What is the highest level of education you have completed?

A. 1st through 8th grade

B. Some high school (grades 9-12)

C. Graduated high school

D. Attended college less than 1 year

E. Attended college 1-3 years

F. Graduated from 4-year college

G. Post graduate study without degree

H. Post graduate study with degree

17: Please circle the letter that best describes your total annual household income:

A. under $10,000

B. $10,000-$14,999

C. $15,000-$19,999

D. $20,000-$24,999

E. $25,000-$29,999

F. $30,000-$34,999

G. $35,000-$39,999

H. $40,000-$44,999

I. $45,000-$49,999

J. $50,000-$54,999

K. $55,000-$59,999

L. $60,000-$74,999

M. $75,000-$99,999

N. Over $100,000

Please address all replies to:
PC Ace Readers Survey, RR 1, Box 363AA, Proctorville, OH 45669

★ THE ARMORY ★

Get A Grip

Suncom's top-of-the-line joysticks

by Tom "KC" Basham
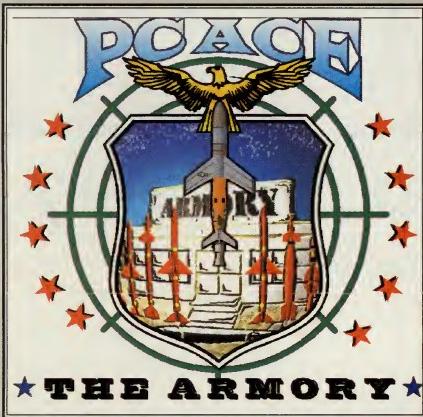
Suncom has launched its entry into the high-end peripheral market with a series of well-designed joysticks molded after the grip found in the F-15E. All four joysticks in the series use the same solid, well-designed grip although each model varies in functionality. The grip feels much more solid than the Thrustmaster FLCS, more akin to the Thrustmaster TQS throttle controller. Approximately 12% smaller than the grip found in the actual jet, the Suncom joysticks feature a large, stable base designed to stay in place even when abused. The two top-end sticks, the *Eagle* and the less-functional *Talon,* feature two hat switches, four buttons, and four "auto fire" buttons which vary in functionality from model to model.

Both sticks utilize two cables. One connector plugs directly into the computer's game port, the other plugs into the keyboard port. They keyboard subsequently connects to the stick. Thrustmaster WCS users can use their throttle with the Suncom stick by connecting stick's output cables to the WCS instead of the computer, then connecting the WCS to the computer as usual. The stick's keyboard cable contains two built-in connectors, one for the "normal" keyboard connector and one for the smaller PS/2 connector. Additionally, the *Eagle* includes an extension cord for your sound card. Additional plugs for the microphone and speaker output extend from the joystick connector. A small, inline box near the joystick contains a microphone jack, speaker output jack, and a volume control. The *Talon* lacks this feature.

Both sticks are user programmable, although the *Talon* allows only basic, single-key programs on the primary fire buttons while the *Eagle* allows multiple-key macros. Both sticks feature a "panic button" which

immediately disables the user program and passes the four primary fire buttons as normal, analog joystick buttons. Users program the *Talon* by setting a switch to "program mode," pressing the button to be programmed, then pressing the desired single key stroke. The *Eagle,* however, uses a more-detailed programming utility, allowing users to program single keystrokes, multiple keystroke macros, and individual key "press" and "release" codes.

The *Eagle* ships with numerous additional items. Each *Eagle* comes with a small complimentary set of headphones. Besides the additional programming software, the *Eagle* includes predefined program files for 35 different products, including most flight simulators released in recent years. The *Eagle* also includes a CD-ROM tutorial as well as a short programming manual.

The sticks are very sturdily designed and comfortable to use, with a smooth yet precise mechanical motion reminiscent of CH's joysticks while providing the user programmability of Thrustmaster equipment. The *Talon,* retailing for around $77, offers a functional, low cost alternative to the Thrustmaster FLCS. The *Eagle,* however, retails for approximately the same price as the FLCS, roughly $120. Although the *Eagle* contains less programmability than the FLCS, it offers sufficient programming features to meet many users' needs. Ultimately, it comes down to the user's tastes when deciding between an *Eagle* or an FLCS. For in-

Suncom's Eagle joystick

formation on other Suncom products, check out their web page at http://www.xnet .com/~reno/suncom.html.

On Target:
Excellent grip, sturdy mechanics, *Talon* provides a low-cost alternative to the TM FLCS. Talon Street Price: $77
Eagle Street Price: $120

Missed The Mark:
Eagle offers slightly less functionality than the FLCS for approximately the same price.

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